

# Lectures in **UROLOGY**

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### Case Taking

- History
- Physical Examination
- Investigations

#### *I- History*

##### **A- Personal history:**

Name, age, sex, occupation, habits, marital status .....

##### **B- Complaint.: patient words**

##### **C- Present history including:**

1. Pains
2. Masses
3. Symptoms related to the act of micturition
4. Changes in the physical character of urine.
5. Symptoms of CRF.
6. Symptoms of metastasis.
7. Related gastrointestinal symptoms.
8. Symptoms related to sexual problems.
9. Symptoms related to other system affection.
10. Other objective manifestations

#### *1- Pain*

- **Analysis of pain:** Pain arising from the GU tract may be quite severe and is usually associated with either urinary tract obstruction or inflammation
- **Pain according to its site**
  - Renal
  - Ureteric
  - Bladder
  - Prostatic
  - Testicular
  - Epididymal

## CASE TAKING

- Dull aching pain.( renal pain )
- Renal colic.

- Renal pain: It is a dull aching pain felt in the loin usually caused by acute distention of the renal capsule
- Renal colic: Usually felt in the loin and radiate to the groin.

### Ureteric Pains:

varies according to site of origin in the ureter

*Upper third:* More or less similar to renal colic.

*Middle third:* Pain in this part should be differentiated from that of APPENDICITIS on the right side and DIVERTICULITIS on the left side.

*Lower third:* e.g. stone lodged at the ureterovesical Junction. This pain may be associated with:

- Irritative bladder symptoms.
- Pain referred to the tip of the penis in males.
- Pain referred to the labium majus in females.

### Vesical Pain

Vesical pain is usually produced either by over distention of the bladder as a result of acute urinary retention or by inflammation. Constant suprapubic pain that is unrelated to urinary retention is seldom of urologic origin.

### Prostatic Pain

Prostatic pain is usually secondary to inflammation with secondary edema and distention of the prostatic capsule

### Penile Pain

Pain in the flaccid penis is usually secondary to inflammation in the bladder or urethra, with referred pain that is experienced maximally at the urethral meatus

### Testicular Pain

Scrotal pain may be either primary or referred. Primary pain arises

## CASE TAKING

from within the scrotum and is usually secondary to acute epididymitis or torsion of the testicle or testicular appendices

### 2- Mass in Urology

- RENAL
- BLADDER
- PROSTATIC
- EPIDIDYMAL
- SUPRARENAL
- TESTICULAR

### 3- Symptoms related to the act of micturition (Lower urinary tract symptoms)

- a- Obstructive voiding symptoms
- b- Irritative voiding symptoms
- c- Day and night incontinence

#### a- Obstructive Voiding Symptoms

- As in clinical BPH
  - *Weak and narrow urinary stream.*
  - *Difficulty To initiate (hesitancy)*  
*To maintain (intermittency)*  
*To terminate (post-micturition dribbling)*

#### b - Irritative Bladder Symptoms

- For example *cystitis*.
- These symptoms include:
  - *Frequency.*
  - *Burning micturition.*
  - *Urgent and*
  - *Urge incontinence.*

#### c- Incontinence

- Stress incontinence.
- Urge incontinence.
- Total incontinence
- Paradoxical ( false incontinence) or chronic retention with overflow incontinence as in BPH... what is the mechanism?

### 4- Changes in physical characters of urine

## CASE TAKING

### 5- Symptoms of CRF as:

- Loss of concentration
- Pallor, Asthenia, Anorexia
- Headache
- Others

### 6- Symptoms of metastasis

- Chest
- Liver
- Bones
- Other kidney
- Others

### 7- Related gastrointestinal symptoms

- Renointestinal reflexes: nausea, vomiting, diarrhea.

### 8- Symptoms related to sexual & fertile problems as

- Libido
- Erection
- Ejaculation
- Orgasm
- Infertility

### 9- Symptoms related to other system affection

eg

- Urinary-Fecal fistula
- Vesico-vaginal fistula
- Others

### 10- Other objective manifestations

- Urethral discharge
- Skin lesions of the external genitalia and perineum
- Edema of lower limb
- Bloody ejaculation
- Gynecomastia
- Size of the penis in infant or child

## II- Examination

- General: ulse, B.P. and chest examinant
- Abdominal examination

### 1- Kidneys Examination:

- **In the adult**, the kidneys are normally difficult to palpate because of their position under the diaphragm and ribs with abundant musculature both anteriorly and posteriorly
- **In children and thin women**, it may be possible to palpate the lower pole of the right kidney with deep inspiration
- **In neonates**, the kidneys can be felt quite easily by palpating the flank between the thumbs anteriorly and the fingers over the costovertebral angle posteriorly.
- Transillumination of the kidneys may be helpful in children younger than 1 year with a palpable flank mass.
- Fluid-filled masses such as cysts or hydronephrosis produce a dull reddish glow in the anterior abdomen. Solid masses such as tumors do not transilluminate.
- Percussion should be done gently, because in a patient with significant renal inflammation, this may be quite painful.
- Auscultation of the upper abdomen during deep inspiration may occasionally reveal a systolic bruit associated with renal artery stenosis or an aneurysm. A bruit may also be detected in association with a large renal arteriovenous fistula.



## CASE TAKING

- Every patient with flank pain should also be examined for possible nerve root irritation.

### 2- Bladder Examination:

- A normal bladder in the adult cannot be palpated or percussed until there is at least 150 mL of urine in it.
- At a volume of about 500 mL, the distended bladder becomes visible in thin patients as a lower midline abdominal mass.
- Percussion is better than palpation for diagnosing a distended bladder
- DRE: Anal tone, prostate and bladder base

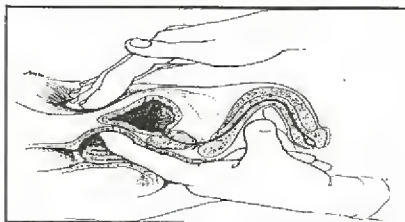
### A careful bimanual examination:

- It is best done with the patient under anesthesia, is invaluable in assessing the regional extent of a bladder tumor or other pelvic mass.

#### Bimanual exam in female



#### Bimanual exam in male





## CASE TAKING

### 4- Examination of Scrotum and its Contents

- The testes are normally oval, firm, and smooth; in adults, they measure about 6 cm in length and 4 cm in width.
- The testes normally have a firm, rubbery consistency with a smooth surface.
- Because the scrotum, unlike the penis, contains both hair and sweat glands, it is a frequent site of local infection and sebaceous cysts.
- A firm or hard area within the testis should be considered a malignant tumor until proved otherwise. The epididymis should be palpable as a ridge posterior to each testicle. Masses in the epididymis (spermatocele, cyst, and epididymitis) are almost always benign.
- To examine for a hernia, the physician's index finger should be inserted gently into the scrotum and invaginated into the external inguinal ring.

**5- Digital Rectal Examination:** to examine the anal tone and prostate, as well as, bladder base

### *Urine Examination*

#### Urine sample

- To evaluate for a possible *infection in a female*, a catheterized urine sample should always be obtained.
- **Neonates and Infants:** The best way to obtain an uncontaminated specimen from the bladder is by percutaneous suprapubic aspiration of urine.
- All urine samples should be examined within 1 hour of collection and plated for culture and sensitivity if indicated.
- **Specific Gravity and Osmolality:** are easily determined from a urinary dipstick and usually varies from 1.001 to 1.035.
- usually reflects the patient's state of hydration, but may also be affected by abnormal renal function, the amount of material dissolved in the urine, and a variety of other causes



## CASE TAKING

### Osmolality

- Less than 1.008 is regarded as dilute, and a specific gravity greater than 1.020 is considered concentrated.
- A fixed specific gravity of 1.010 is a sign of renal insufficiency, either acute or chronic.
- Osmolality is a measure of the amount of material dissolved in the urine and usually varies between 50 and 1200 mOsm/L.

### Turbidity

- **Cloudy urine** is most commonly due to phosphaturia
- Pyuria, usually associated with a UTI, is another common cause of cloudy urine. The large number of white blood cells causes the urine to become turbid. Pyuria is readily distinguished from phosphaturia either by smelling the urine (infected urine has a characteristic pungent odor) or by microscopic examination, which readily distinguishes amorphous phosphate crystals from leukocytes.

### Proteinuria

#### Causes:-

- Normal conditions such as strenuous exercise. It depends on the state of hydration, but it seldom exceeds 20 mg/dL.
- In patients with glomerular lesions

### Chemical Examination of Urine

- **Urine Dipstick:** The abnormal substances commonly tested for with a dipstick include (1) blood, (2) protein, (3) glucose, (4) ketones, (5) urobilinogen and bilirubin, and (6) white blood cells.
- Excess urine on the dipstick or holding the dipstick in a vertical position will allow mixing of chemicals from adjacent reagent pads on the dipstick, resulting in a faulty diagnosis.

## Symptoms of Urinary Tract Diseases

### Pain in Urology

#### 1-Renal Pain and renal colic

- ***Ipsilateral renal pain:*** Costovertebral angle just lateral to the sacrospinalis muscle and beneath the 12th rib. Pain is usually caused by acute distention of the renal capsule, generally from inflammation or obstruction
- ***Renal colic*** may radiate across the flank anteriorly toward the upper abdomen and umbilicus and may be referred to the testis or labium

#### *Pain nature*

- ***Inflammatory pain*** is usually steady, whereas pain due to obstruction fluctuates in intensity.
- ***Ureteral obstruction*** is typically colicky in nature and intensifies with ureteral peristalsis, at which time the pressure in the renal pelvis rises as the ureter contracts in an attempt to force urine past the point of obstruction.
- Pain of renal origin may be associated with gastrointestinal symptoms
- Renal pain may also be confused with pain resulting from irritation of the costal nerves, most commonly T10-T12.

#### 2-Ureteral obstruction

##### *Cause and site*

- The site of ureteral obstruction can often be determined by the location of the referred pain.
- The pain results from acute distention of the ureter and by hyperperistalsis and spasm of the smooth muscle of the ureter as it attempts to relieve the obstruction, usually produced by a stone or blood clot.
- Lower ureteral obstruction frequently produces symptoms of *vesical irritability*, including frequency, urgency, and suprapubic discomfort that may radiate along the urethra in men to the tip of the penis.

## Symptoms of Urinary Tract Diseases

### 3-Vesicle Pain

- Constant suprapubic pain that is unrelated to urinary retention is seldom of urologic origin
- Inflammatory conditions of the bladder usually produce intermittent suprapubic discomfort
- The pain in conditions such as bacterial cystitis or interstitial cystitis is usually most severe when the bladder is full and is relieved at least partially by voiding
- The pain referred to the distal urethra that is associated with irritative voiding symptoms such as urinary frequency and dysuria.
- sometimes, sharp, stabbing suprapubic pain at the end of micturition, and this is termed *strangury*

### 4-Prostatic Pain

- Is usually secondary to inflammation with secondary edema and distention of the prostatic capsule
- Is poorly localized, and the patient may complain of lower abdominal, inguinal, perineal, lumbosacral, and/or rectal pain.
- Is frequently associated with irritative urinary symptoms

### 5-Penile Pain

- *In the flaccid penis* is usually secondary to inflammation in the bladder or urethra, with referred pain that is experienced maximally at the urethral meatus.
- *Pain in the erect penis* is usually due to *Peyronie's disease* or *priapism*

### 6-Testicular Pain

- Is usually secondary to acute epididymitis or torsion of the testicle or testicular appendices
- Acute epididymitis and testicular torsion -difficult to distinguish these two conditions, therefore, any testicular pain in a male of pubertal

### 7-Scrotal pain

- Chronic scrotal pain is usually related to noninflammatory conditions such as a hydrocele or a varicocele,

### Hematuria

- **Definition:** is the presence of blood in the urine; greater than three red blood cells per high-power microscopic field (HPF) are significant.
- Hematuria of any degree should never be ignored and, in adults, should be regarded as a symptom of urologic malignancy until proved otherwise.

Hematuria can be distinguished from hemoglobinuria and myoglobinuria by microscopic examination of the centrifuged urine; the presence of a large number of erythrocytes establishes the diagnosis of hematuria. If erythrocytes are absent, examination of the serum will distinguish hemoglobinuria and myoglobinuria.

In hemoglobinuria, the supernatant will be pink.

In myoglobinuria the serum remains clear.

In addition to dehydration, another cause of false-positive results is exercise, which can increase the number of erythrocytes in the urine

### Gross versus Microscopic Hematuria

- The chances of identifying significant pathology increase with the degree of hematuria
- Common for patients with minimal degrees of microscopic hematuria to have a negative urologic evaluation.

### Timing of Hematuria

- **Initial hematuria** usually arises from the urethra; usually secondary to inflammation.
- **Total hematuria** is most common and indicates that the bleeding is most likely coming from the bladder or upper urinary tracts
- **Terminal hematuria** occurs at the end of micturition and is usually secondary to inflammation in the area of the bladder neck or prostatic urethra. At the end of micturition, the bladder neck contracts, squeezing out the last amount of urine.

### Presence of Clots

- **Shape of Clots :**

## Symptoms of Urinary Tract Diseases

- *Vermiform (wormlike) clots*, particularly if associated with flank pain, identifies the hematuria as coming from the upper urinary tract
- *Discolored clots*; usually is coming from the urinary bladder eg. bladder cancer

### Differential Diagnosis and Evaluation of Hematuria

- Hematuria of nephrologic origin is frequently associated with casts in the urine and almost always associated with significant proteinuria. Even significant hematuria of urologic origin will not elevate the protein concentration in the urine into the 100 to 300 mg/dL or 2+ to 3+ range on dipstick.
- Erythrocytes arising from glomerular disease are typically dysmorphic and show a wide range of morphologic alterations. Conversely, erythrocytes arising from tubulointerstitial renal disease and of urologic origin have a uniformly round shape
- Erythrocyte morphology is more easily determined using phase contrast microscopy, but with practice, this can be accomplished using a conventional light microscope.
- Glomerular Hematuria: Erythrocytes arising from glomerular disease are typically dysmorphic and show a wide range of morphologic alterations
- Conversely, erythrocytes arising from tubulointerstitial renal disease and of urologic origin have a uniformly round shape ; these erythrocytes may or may not retain their hemoglobin ("ghost cells" )
- Erythrocyte morphology is more easily determined using phase contrast microscopy, but with practice, this can be accomplished using a conventional light microscope.
- Frequently, a renal biopsy is necessary to establish the precise diagnosis, and biopsies are particularly important if the result will influence subsequent treatment of the patient.

### Nonglomerular Hematuria-Medical

The presence of circular erythrocytes and the absence of erythrocyte casts are frequently associated with significant proteinuria, which distinguishes these nephrologic diseases from urologic diseases in which the degree of proteinuria is usually minimal, even with heavy bleeding.

## Symptoms of Urinary Tract Diseases

- Papillary necrosis as a cause of hematuria should be considered in diabetics, African Americans (secondary to sickle cell disease or trait), and suspected analgesic abusers.
- Anticoagulation at normal therapeutic levels, however, does not predispose patients to hematuria.
- Thus, anticoagulant therapy per se does not appear to increase the risk of hematuria unless the patient is excessively anticoagulated.

### Exercise-induced hematuria

- Exercise-induced hematuria may be the first sign of underlying glomerular disease such as IgA nephropathy. Conversely, cystoscopy in patients with exercised-induced hematuria frequently reveals punctate hemorrhagic lesions in the bladder, suggesting that the hematuria is of bladder origin.

### Lower Urinary Tract Symptoms (LUTS)

#### *Irritative Symptoms :*

- *Frequency:* The normal adult voids five or six times per day, with a volume of approximately 300 mL with each void.
- Urinary frequency is due either to increased urinary output (polyuria) or to decreased bladder capacity.
- By separating irritative from obstructive symptoms, the clinician should be able to arrive at a proper differential diagnosis.
- Dysuria is painful urination that is usually caused by inflammation. This pain is usually not felt over the bladder but is commonly referred to the urethral meatus. Dysuria is frequently accompanied by frequency and urgency.
- Obstructive Symptoms  
*Decreased force of urination:* results from benign prostatic hyperplasia (BPH) or a urethral stricture.

#### Obstructive Symptoms

- *Urinary hesitancy* refers to a delay in the start of micturition. Normally, urination begins within a second after relaxing the urinary sphincter, but it may be delayed in men with bladder outlet obstruction.



## Symptoms of Urinary Tract Diseases

- **Intermittency** refers to involuntary start-stopping of the urinary stream. It most commonly results from prostatic obstruction with intermittent occlusion of the urinary stream by the lateral prostatic lobes.
- **Postvoid dribbling** refers to the terminal release of drops of urine at the end of micturition. This is secondary to a small amount of residual urine in either the bulbar or the prostatic urethra that is normally "milked-back" into the bladder at the end of micturition.
- **Straining** refers to the use of abdominal musculature to urinate.

## Incontinence

- **Urinary incontinence** is the involuntary loss of urine subdivided into four categories :

**1-Continuous incontinence:** Continuous incontinence is most commonly due to a urinary tract fistula that bypasses the urethral sphincter. Eg. vesicovaginal fistula

Ectopic ureter that enters either the urethra or the female genital tract.

Ectopic ureters never produce urinary incontinence in males, because they always enter the bladder neck or prostatic urethra proximal to the external urethral sphincter.

**2-Stress urinary incontinence** refers to the sudden leakage of urine with coughing, sneezing, exercise, or other activities that increase intra-abdominal pressure /intra-abdominal pressure rises transiently above urethral resistance, resulting in a sudden, usually small amount of urinary leakage

Stress urinary incontinence is difficult to manage pharmacologically, and patients with significant stress incontinence are usually best treated surgically.

**3-Urgency incontinence** is the precipitous loss of urine preceded by a strong urge to void.

Cystitis, neurogenic bladder, and advanced bladder outlet obstruction with secondary loss of bladder compliance

Patients with urgency incontinence usually are not amenable to surgical correction but, rather, are more appropriately treated with pharmacologic agents that increase bladder compliance and/or increase urethral resistance.



*4-Overflow urinary incontinence*, often called *paradoxical incontinence*, is secondary to advanced urinary retention and high residual urine volumes the bladder is chronically distended and never empties completely. Urine may dribble out in small amounts as the bladder overflows.

Overflow incontinence has been termed paradoxical incontinence because it can often be cured by relief of bladder outlet obstruction.

### **Enuresis**

- Urinary incontinence that occurs during sleep
- Normally in children up to 3 years of age but persists in about 15% of children at age 5 and about 1% of children at age 15 Children over age 6 years with enuresis should undergo a urologic evaluation, although the vast majority will be found to have no significant urologic abnormality.

### **Sexual Dysfunction**

- **Definition:** inability to achieve and maintain an erection adequate for intercourse. Patients presenting with "impotence" should be questioned carefully to rule out other male sexual disorders including loss of libido, absence of emission, absence of orgasm, and, most commonly, premature ejaculation. Obviously, it is important to identify the precise problem before proceeding with further evaluation and treatment.
- **Causes of Loss of Libido :**
  - 1-*Androgen deficiency* arising from either pituitary or testicular dysfunction. This can be evaluated directly by measurement of serum testosterone that, if abnormal, should be further evaluated by measurement of serum gonadotropins and prolactin
  - 2-*depression and a variety of medical illnesses* that affect general health and well-being.
- **Psychogenic:** patients who are able to achieve adequate erections in some situations but not others have primarily psychogenic rather than organic impotence.

## Symptoms of Urinary Tract Diseases

### Absence of Orgasm

- Anorgasmia is usually psychogenic or caused by certain medications used to treat psychiatric diseases
- Decreased penile sensation owing to impaired pudendal nerve function. Most commonly, this occurs in diabetics with peripheral neuropathy

### Premature Ejaculation

- It is common for men to ejaculate within 2 minutes after initiation of intercourse,
- men with true premature ejaculation who reach orgasm within less than 1 minute after initiation of intercourse
- This problem is almost always psychogenic and best treated by a clinical psychologist

### Hemospermia

- It almost always results from nonspecific inflammation of the prostate and/or seminal vesicles and resolves spontaneously, usually within several weeks.
- Exclude the presence of tuberculosis, a prostate-specific antigen (PSA) and a rectal examination done to exclude prostatic carcinoma, and a urinary cytology done to exclude the possibility of transitional cell carcinoma of the prostate. It should be emphasized; however, that hemospermia almost always resolves spontaneously and rarely is associated with any significant urologic pathology.

### Urethral Discharge

- Urethral discharge is the most common symptom of venereal infection.
- A purulent discharge that is thick, profuse, and yellow to gray is typical of gonococcal urethritis; the discharge in patients with nonspecific urethritis is usually scant and watery. A bloody discharge is suggestive of carcinoma of the urethra.

### Fever and Chills

- Pyelonephritis, prostatitis, or epididymitis
- When associated with urinary obstruction, fever and chills may portend septicemia and necessitate emergency treatment to relieve obstruction.

### *Pelvic Examination in the Female*

- Male urologists should always perform the female pelvic examination with a female nurse or other health professional present.
- Bimanual examination of the bladder, uterus, and adnexa should then be performed with two fingers in the vagina and the other hand on the lower abdomen). Any abnormality of the pelvic organs should be evaluated further with a pelvic ultrasound or CT scan.

### *Urine sample*

- To evaluate for a possible infection in a female, a catheterized urine sample should always be obtained.
- *Neonates and Infants* :The best way to obtain an uncontaminated specimen from the bladder is by percutaneous suprapubic aspiration of urine
- All urine samples should be examined within 1 hour of collection and plated for culture and sensitivity if indicated.

### *Turbidity of urine*

- Cloudy urine is most commonly due to phosphaturia
- Pyuria, usually associated with a UTI, is another common cause of cloudy urine. The large numbers of white blood cells cause the urine to become turbid. Pyuria is readily distinguished from phosphaturia either by smelling the urine (infected urine has a characteristic pungent odor) or by microscopic examination, which readily distinguishes amorphous phosphate crystals from leukocytes.
- *Specific Gravity and Osmolality*: is easily determined from a urinary dipstick and usually varies from 1.001 to 1.035.
- Usually reflects the patient's state of hydration, but may also be affected by abnormal renal function, the amount of material dissolved in the urine, and a variety of other causes

### *Osmolality*

- Less than 1.008 is regarded as dilute, and a specific gravity greater than 1.020 is considered concentrated. A fixed specific gravity of 1.010 is a sign of renal insufficiency, either acute or chronic.
- Osmolality is a measure of the amount of material dissolved in the urine and usually varies between 50 and 1200 mOsm/L

## Symptoms of Urinary Tract Diseases

### Urine pH

- **PHF:** Urinary pH may vary from 4.5 to 8; the average pH varies between 5.5 and 6.5. A urinary pH between 4.5 and 5.5 is considered acidic, whereas a pH between 6.5 and 8 is considered alkaline.
- The urinary pH reflects the pH in the serum
- Renal tubular acidosis (RTA) presents an exception to this rule because of continued loss of bicarbonate in the urine
- Inability to acidify the urine below a pH of 5.5 following administration of an acid load is diagnostic of RTA.
- In patients with a presumed UTI, an alkaline urine with a pH greater than 7.5 suggests infection with a urea-splitting organism, most commonly *Proteus*
- Urease-producing bacteria convert ammonia to ammonium ions, markedly elevating the urinary pH, and causing precipitation of calcium magnesium ammonium phosphate crystals. The massive amount of crystallization may result in staghorn calculi.

### Chemical Examination of Urine

- **Urine Dipsticks:** The abnormal substances commonly tested for with a dipstick include (1) blood, (2) protein, (3) glucose, (4) ketones, (5) urobilinogen and bilirubin, and (6) white blood cells.
- Excess urine on the dipstick or holding the dipstick in a vertical position will allow mixing of chemicals from adjacent reagent pads on the dipstick, resulting in a faulty diagnosis.

### Proteinuria

- Although healthy adults excrete 80 to 150 mg of protein in the urine daily, the qualitative detection of proteinuria in the urinalysis should raise the suspicion of underlying renal disease. Proteinuria may be the first indication of renovascular, glomerular, or tubulointerstitial renal disease, or it may represent the overflow of abnormal proteins into the urine in conditions such as multiple myeloma.
- Normal conditions such as strenuous exercise.
- Depends on the state of hydration, but it seldom exceeds 20 mg/dL. In patients with dilute urine

## ANURIA AND RETENTION

### ANURIA

#### Definitions:

**Anuria:** No urine is voided by the patient for 24hr while bladder is empty

**Oliguria:** Patient voids <400 ml urine / 24 hr while bladder is empty

#### Incidence:

Age: any age but more in 4<sup>th</sup> decade

Sex: ♂ to ♀ = 9: 1

#### Causes:

**I. Pre-renal:** due to decreased renal perfusion e.g:  
dehydration

**II. Renal:** due to parenchymal disease

E.g AGN (acute glomerulo nephritis)

**III. Post-renal (obstructive Anuria)**

Due to: 1. Bilateral Ureteral obstruction or  
2. Unilateral Ureteral obstruction if other kidney: is absent or removed or non-functioning

**Postrenal Causes may be :**

#### A. Intraluminal:

- Stones
- Blood. Clots.

#### B. Mural:

- PUJ obstruction
- Stricture of ureter
- Uretic polyps, tumors or valves

#### C. Extra luminal:

- Retroperitoneal fibrosis
- Pelvic malignancy infiltrating the lower ureter

## ANURIA AND RETENTION

- Accidental ligation of both ureter during gynecological surgery
- Pregnancy (rare)

### Clinical picture of obstructive Anuria:

1. History of stones or urological operations
2. Onset of Anuria is preceded by renal colic, oligurea and then anuria

### Investigations for obstructive Anuria:

#### I - Laboratory:

1. Serum creatinine.
2. B.U.N : usually remains normal (Blood Urea Nitrogen)
3. BUN / Creatinine ratio: If  $>10 \rightarrow$  suggestive of obstructive Anuria.
4. P.H: acidosis due to:
  - Anaerobic metabolism
  - Failure of  $H^+$  excretion by distal nephron
5. Electrolytes
  - $\uparrow$  serum Na. , K
  - $\uparrow$  osmolality
6. HB :  $\downarrow$

#### II - Radiological:

1. K.U.B Detect: Stones
  - Soft tissue shadow of kidney.
2. U/S:
  - 100% sensitivity to detect obstruction
  - Can detect: Back pressure dilated ureter  
Parenchymal thickness  
Radiolucent stone.

#### 3. Retrograde pyelography

#### 4. Ante grade pyelography

#### 5. Reno gram:

##### Indications:

- Patient with contrast allergy
- Doubtful cases
- Infants and children:
- 94% accuracy in diagnosis of obstructive Anuria
- Most reliable method to assess renal function
- 6. CT scan is the golden tool of imaging of obstructive Anuria.



## ANURIA AND RETENTION

### Its disadvantages are:

- Expensive
- Difficult in children
- Not available in every center

### Treatment of obstructive Anuria

#### I - Emergency management:

1. Diuresis: Lasix 80 mg I.V.
  - Done while preparing patient for next step.
  - Relief of edema which is responsible for conversion of incomplete obstruction to complete.
2. Ureteral catheterization
  - Efficient for short term drainage & retrograde study
  - Difficult in infant & children
3. PCN is done as:
  - Therapeutic and diagnostic as ante grade pyelography
  - Most effective means of draining of obstructed kidneys
  - Useful in infant & children and after failed ureteral catheter
4. Open Nephrostomy
5. Dialysis in
  - Severe uremia.
  - Hyperkalaemia
  - Pulmonary edema
6. Symptomatic treatment for:
  - Hypertension
  - H.F
  - Nausea of vomiting
  - Irritability

#### II - Monitoring of PH & Electrolytes

#### III - Treatment of the cause e.g. stones, tumors, strictures, etc...



### *Urine Retention*

#### Definition:

Inability to void urine while the bladder is full.

- Mechanism of micturition:

Micturition is net result of detrussor muscle contraction against outlet resistance & so the etiology depends on these two factors.

#### Causes:

##### *A. Structural causes:*

##### **I - Intraluminal:**

- Stone posterior urethra
- Blood clots
- F.B

##### **II - Mural:**

- Urethra :
  - Urethral stricture
  - Posterior urethral valve
  - Urethral tumors
  - Severe anterior urethritis
  - External meatal ulcer & scab.
- Prostate
  - B.P.H
  - Cancer prostate
  - Prostate abscess
  - Acute prostatitis.
- Bladder
  - Bladder neck contracture
  - Cancer bladder encroaching on the bladder neck.

##### **III - Extramural**

- Carcinoma of penis
- Peri urethral abscess
- Phimosis.
- Rupture of urethra in fracture pelvis
- Pelvic masses:

## ANURIA AND RETENTION

- Large bladder diverticulum
- Lymphatic cyst
- Retroverted gravid uterus
- Incarcerated ovarian cyst
- Pelvic tumor → Rhabdomyosarcoma in children

### **B. Functional causes:**

#### **I - Neurogenic:**

- Spinal shock
- Neurogenic bladder

#### **II - Hysterical: in females**

#### **III - Post operative Pain → reflex spasm of external urethral sphincter**

#### **IV - Drugs:**

- Anti cholinergic drugs → relax detrusor ms
- α adrenergic drugs → spasm bladder neck

### **Types of Retention**

#### **A. Acute Retention:**

- Sudden onset
- Complete retention of urine
- Severe pain & tenderness in suprapubic region.
- May occur on top of chronic retention due to complete urethral obstruction.

#### **B. Chronic Retention:**

- Gradual onset
- Incomplete retention of urine (large volume of residual urine after voiding).
- No pain or tenderness except if acute retention develop on top of chronic retention
- Patient has frequency & voids small volume
- Finally passes to chronic retention with overflow, incontinence as bladder becomes distended without ability to initiate contraction.

#### **I - Bladder changes:**

- a. Stage of compensation:
  - Hypertrophy of detrusor muscle. → High Intravesical pressure → No significant residual urine.

## ANURIA AND RETENTION

### b. Stage of decompensation:

- Failure of detrusor muscle → pressure of significant residual urine after voiding → lastly chronic retention with overflow.

### II - Ureter & kidney changes:

→ Hydroureter and Hydronephrosis due to:

1. Trigonal hypertrophy (↑ resistance to urine flow)
2. Stretch of trigone (in decompensation stage)
3. Vesicoureteral reflux (in decompensation stage)

### Clinical picture:

#### A. History:

- Age & sex
- Trauma to urethra or spinal cord
- Operation
- Endoscopy
- Diseases: neurological, venereal
- Loin pain
- Irritative & obstructive symptoms
- Hematuria & chyluria

#### B. Examination:

1. Abdominal exam: Swelling
  - Suprapubic and regular
  - Cystic
  - Painful and tender in acute retention
  - Painless and not tender in chronic retention
2. PR - P.V.
  - Full bladder
  - Weak anal tone
  - Prostate lesion
3. Penis & urethral examination
4. Neurological examination.

### Complications:

- Infection
- Stone
- R.F
- Chronic irritation

## ANURIA AND RETENTION

- Squamous metaplasia & Sq. C.C.

### Investigations:

#### I - Laboratory:

Serum creatinine & hemoglobin

#### II - Radiological:

##### 1. K.U.B:

- Stone
- Fracture pelvis
- Secondaries in cancer prostate

##### 2. Ascending urethrography: Show

- Stricture urethra
- Urethral rupture.

##### 3. Micturating cystourethrogram (MCUG)

- Post-urethral value in children
- There will be ballooning (elongation and dilatation) of post urethra during micturition.

##### 4. US: to diagnose

- Full bladder
- Cause of retention
- Complication.

##### 5. CT scan: Cause of retention as Rhabdomyosarcoma in children.

#### III - Panendoscopy: to show urethral, prostate & bladder lesions.

#### IV - Urodynamic studies : in cases of neurogenic bladder

### Treatment

- Relief of retention
- Treatment of the cause.

#### I - Relief of retention

##### 1. Urethral catheter

- Tried in every case if there is no bleeding per urethra
- Urethral catheterization may be
  - Single
  - Temporary.
  - Intermittent.

## ANURIA AND RETENTION

### *Indwelling.*

#### 2. *Suprapubic cystocatheter*

- Insertion of suprapubic tube in the bladder
- Not done in bladder tumor
- Indicated in
  - Failure of urethral catheter
  - Children
  - Chronic retention

#### 3. *Open suprapubic cystostomy*

- Done if suprapubic cystocath not available

#### 4. *Vesicostomy*

- Instead of suprapubic cystostomy

### II - Treatment of the cause

1. *Stricture urethra* → *VIU (visual internal urethrotomy)*
2. *Bladder stone* → *crushing by lithotripter*
3. *Neurogenic bladder* → *treatment of the neurological cause.*

## Congenital Anomalies of Urinary Tract

### I- Anomalies of kidney and ureter

#### 1- Renal Agenesis:

- Absent kidney
- Almost always unilateral (Bilateral agenesis is incompatible with life).

#### 2- Renal Hypoplasia:= Small kidney.

#### 3-Horse- shoe kidney:

Horseshoe kidney is the most common fusion anomaly, with an incidence of approximately 1 in 400 births and a male predominance.

#### 4-Crossed Renal Ectopy

Crossed renal ectopy is an uncommon condition

#### 5-Renal cystic diseases:

##### A) Multicystic kidney:

- Unilateral, non-hereditary.
- The other side is usually normal.

##### B) Hereditary polycystic kidney

- An autosomal dominant condition almost always bilateral.

### 2- Ureter

#### a-Ureteral Duplication:

#### b- Ureteropelvic junction obstruction

#### c- Ureterocele:

#### d- Megaureter

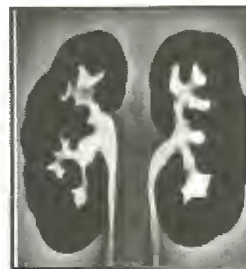
**e-Ectopic Ureter:**



*Horse shoe kidney*



*Ectopic kidney*



*Adult polycystic kidney*

**II. Anomalies of bladder and urethra**

1. Bladder exstrophy
2. Epispadias
3. Hypospadias
4. Posterior urethral valve
5. Phimosis
6. Paraphimosis

**1- Bladder Exstrophy**

**Definition:**



## Congenital Anomalies of Urinary Tract

Complete ventral defect of the urogenital sinus and the overlying skeletal system.;

No anterior abdominal wall

No anterior bladder wall

Absent and splitted dorsal aspect of penis



### Treatment options:

- One stage reconstruction.
- Staged repair.
- Urinary diversion.

## 2- Epispadias

### Definition:

- The external urethral meatus opens abnormally on the dorsum of the penis proximal to the glans' tip.
- It is a mild form of exstrophy and can affect females.

### Types:

- Glandular.
- Penile.
- Penopubic.
- Moreover, it may be continent or incontinent according to the location of the urethral opening in relation to the external urethral sphincter.

## 3- Hypospadias

### Definition:

- The external urethral meatus opens on the ventral aspect of the penis proximal to the glans' tip.

### Types:

According to the location of the meatus.

1. Anterior (distal) type: the commonest.
2. Midpenile
3. Proximal (posterior)



### 4-Chordee:

- Fibrous tissue replaces or surrounds the corpus spongiosum distal to the external urethral opening causing penile ventral curvature.

## Congenital Anomalies of Urinary Tract

### *Proximal (posterior) hypospadias*

#### **Treatment:**

- Age: Optimal age at 2 yrs.
- Surgery:
  - a. One stage surgery
  - b. Two stages repair includes:

#### **a- Aim of 1st stage repair:**

- Chordectomy.
- Straightening of the penis.
- Ventral redistribution of the preputial skin

#### **b- Aim of 2nd stage repair:**

Urethral tube reconstruction.



Midpenile hypospadias

## **4- Phimosis**

#### **Definition:**

Condition in which the contracted foreskin can not be retracted over the glans' penis.

#### **Causes:**

- Chronic preputial infection
- Poor local hygiene in uncircumcized or incompletely circumcised boys.

#### **Clinical picture**

- Oedema.
- Erythema
- Tender prepuce.
- Purulent discharge.

#### **Treatment**

The treatment include :

- Eradication of the local infection.
- Dorsal slit and circumcision.

### **5- Paraphimosis**

Emergency condition in which, the foreskin once retracted over the glans, can not be replaced in its normal position.

- Treated by Urgent dorsal slit and circumcision under cover of systemic antibiotics.

### **6- Posterior urethral valves**

#### **Definition:**

Membrane like structures located at the posterior urethra causing urinary outflow obstruction in boys.

#### **Pathophysiological:**

Outflow obstruction → dilated posterior urethra → bladder trabeculation and diverticulation → reflux or obstruction → bilateral hydronephrosis → renal impairment ± failure.

#### **Presentation:**

- Poor stream.
- Dribbling of urine.
- Urinary retention.
- Persistent urinary tract infection.
- Palpable abdominal mass (Bladder or Kidney).

#### **Treatment options:**

- Fulguration of the valves endoscopically.
- Urinary diversion:
  - Ureterostomy.
  - Vesicostomy
- Reconstruction of the ureters.

## URORADIOLOGY

### I. Conventional Radiological Techniques

1. Plain radiography (UTP )
2. Excretory urography (Descending urography) (IVU)
3. **Retrograde** (Ascending) pyelography.
4. Antegrade pyelography.
5. Cystography
6. Urethrography.
7. Angiography

### II. Ultrasonography

### III. Doppler sonography

### IV. Computed Tomography (CT)

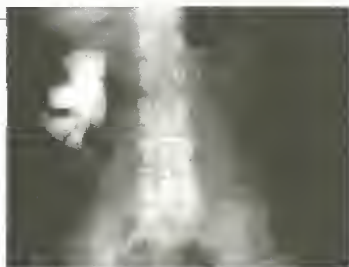
### V. Magnetic Resonance imaging (MRI)

### VI. Radionuclide examination

#### I-Plain X- ray (UTP or KUB)

##### Values:

- 1) Identifications of urinary stones and pathological calcifications.
- 2) Detection of abnormal soft tissue shadow, anomalies of the renal size or contour and loss of psoas silhouette that may represent retroperitoneal pathology.
- 3) Air within the urinary tract may indicate fistulae or infections with gas forming organism.
- 4) Detection of bony abnormalities as metastatic deposits in patient with cancer prostate or spina bifida in patient with neurogenic bladder.

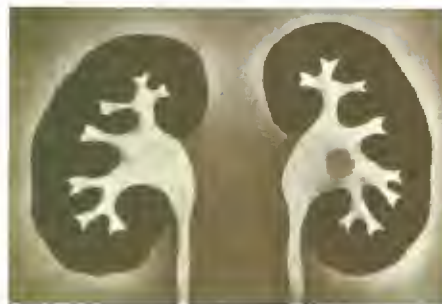


*Urinary tract plain x-ray (UTP) shows large right staghorn calculus and small calculus at the course of proximal left ureter (arrows).*

**2-Excretory urography (Descending urography) (IVU)**



*Chronic pyelonephritis*

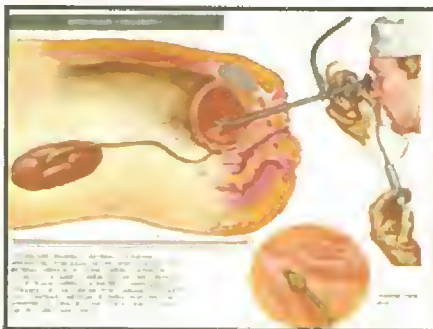


*Radiolucent stone*

### 3. Retrograde pyelography

#### **Definition:**

- ⇒ Radiological method of examination of the collecting system and ureter via injection of contrast media in a retrograde **manner and without relying on the kidney to excrete the contrast**.
- ⇒ The procedure is done in a cystoscopy suit under fluoroscopic control to cannulate the ureter.



*Retrograde pyelography*

#### 4-Antegrade pyelography

Visualization of the urinary tract by direct injection of contrast media into the PCS via a needle or catheter introduced percutaneously

#### 5. Cystography

Visualization of the bladder by filling it with contrast in a retrograde or antegrade fashion.

**Types:** Static and voiding (micturating) Cystography.

*Micturating cystourethrogram (MCUG) demonstrates a posterior urethral valve (PUV) with a tissue flaps that obstruct the flow of urine out of the bladder and dilated posterior urethra.*



#### 6. Urethrography

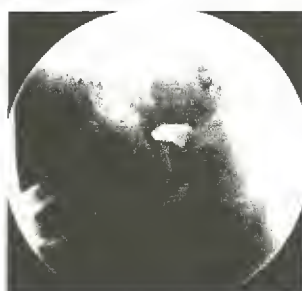
Visualization of the urethra by filling it with CM in a retrograde or antegrade fashion.

**Types:**

Ascending and voiding urethrography



## URORADIOLOGY



*ASCENDING URETHROGRAM: Stricture penile urethra*

### 7- Angiography

**Catheter angiography is still useful in certain circumstances**



*Flush aortogram shows marked proximal left renal artery stenosis (arrow) and diffuse aortic atheroma.*

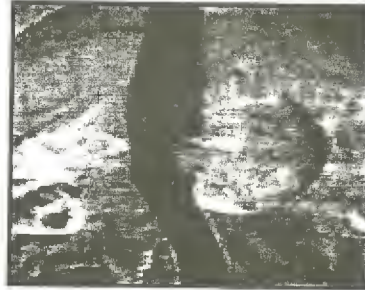
### 8- Venography

#### **Applications:**

- To study the anatomy of renal veins.
- Diagnosis of renal vein and IVC thrombosis.
- Renal veins sampling for rennin assay in patients with renal vascular hypertension.

## URORADIOLOGY

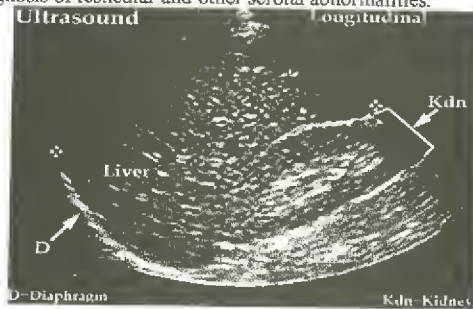
- Adrenal Venography to identify an autonomous hyper functioning adrenal tumor
- Gonadal venography used as a part of varicocele embolization and to identify the pampiniform plexus of an undescended testis.



*Inferior cavography demonstrates IVC thrombus (arrow).*

### II- Ultrasonography

5. Diagnosis of testicular and other scrotal abnormalities.



*Normal right renal ultrasonography*

## URORADIOLOGY



*RENAL US: Mild bilateral hydronephrosis*



*AXIAL T2 MRI: bilateral mild hydronephrosis.*

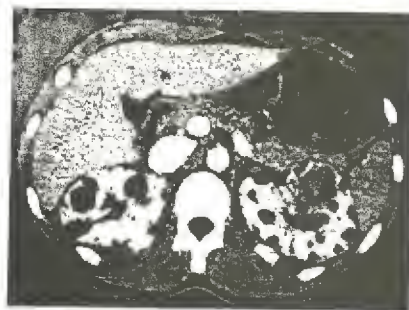
### III- Doppler Sonography

- ⇒ Assessment of renal artery stenosis and renal vein thrombosis.
- ⇒ Detection of Arteriovenous fistula.
- ⇒ Evaluation of renal transplant
- ⇒ Evaluation of suspected scrotal lesions such as torsion, tumour, inflammation and varicocele.

IV. Computed Tomography (CT)



*Axial CT scan showing a 2 cm peripheral right renal solid mass (arrow).*



*Axial CT scan showing a polycystic kidney disease.*

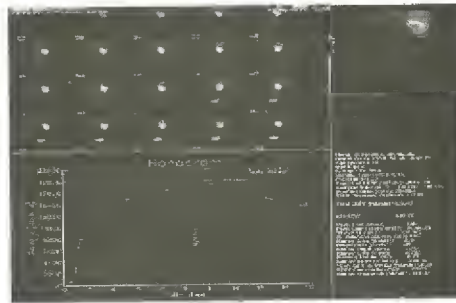
V. Magnetic Resonance Imaging (MRI)

VI- Radionuclide examination

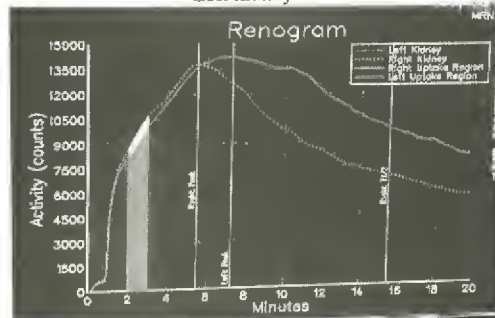
Applications:

## URORADIOLOGY

- 2- Diagnosis of obstructive uropathy and vesico ureteric reflux.
- 3- Diagnosis of renal artery stenosis in hypertensive patients.
- 4- Assessment of renal allograft perfusion and post-operative complications.



RENOGRAM: Right kidney function is 60 ml/min  
Left kidney function is zero



Reno gram:

- Left kidney 83 ml/min
- Right kidney 91 ml/min

## Urinary Tract Trauma

### UPPER URINARY TRACT TRAUMA

#### Renal Trauma

##### Causes of renal trauma

**A. Blunt Trauma:** 90% of renal injuries are due to :

- Motor vehicle, sports.

**B. Penetrating Trauma:**

- E.g. stab and gunshot wounds.

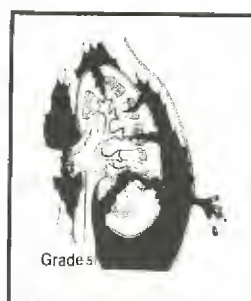
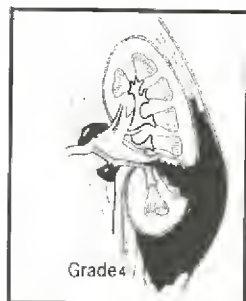
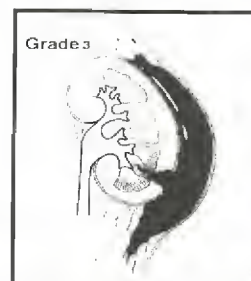
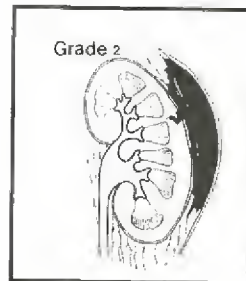
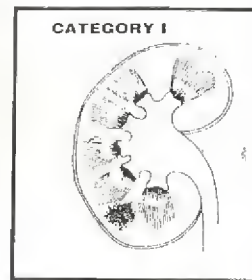
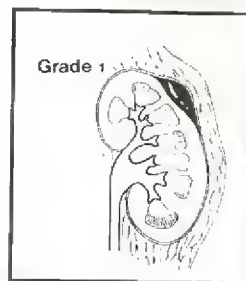
**C. Iatrogenic:**

- Endoscopic e.g. PCNL & open e.g. Nephrolithotomy

Grade 1	Contusion or subcapsular hematoma.
Grade 2	Superficial cortical laceration (< 1cm deep).
Grade 3	Deep cortical laceration (> 1cm deep).
Grade 4	Cortico-medullary laceration into collecting system or Segmental vessel.
Grade 5	Shattered kidney or renal pedicle injury
	Minor 1, 2 (90%),
	Major 3,4,



## Urinary Tract Trauma





**Clinical features:**

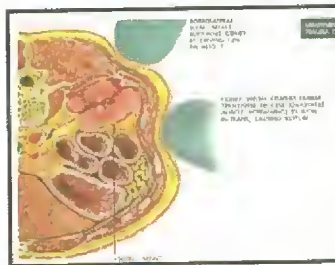
**A. Blunt renal injury should be suspected because of:**

- Hematuria (90% of cases):
  - Imperfect indicator.
  - Minor injury present with gross hematuria.
  - Major injury may have no hematuria.
- Flank pain, swelling or hematoma.
- Evidence of continuous bleeding without obvious site.
- Rib or vertebral fracture.

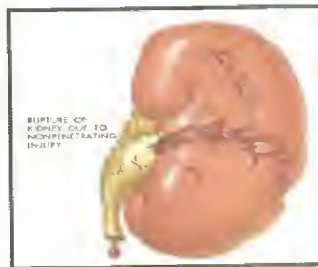
**B. Penetrating renal trauma** is usually self-evident. The potential damage of high velocity missiles is much greater because of the cavitation effect.

**Four 90% Rules:**

- 90% Blunt
- 90% Hematuria
- 90% Minor grade
- 90% Conservative



***Blunt renal Trauma***



***Trauma to the kidney  
after blunt injury***

## Urinary Tract Trauma

### *Investigations:*

A. *Plain x-ray* – fracture of lower ribs.

B. *IVU:*

- Often no excretion from injured kidney.
- Demonstrates presence of contralateral kidney.
- Limited value e.g. intraoperative consultation

C. *C.T. Scan* "the study of choice"

- Shows anatomical details of renal injury (grade, hematoma, urinoma).
- Associated injuries e.g. triple trauma of liver, right kidney and pleura on right side & spleen, left kidney and pleura on left.
- Contralateral kidney.

D. *Selective renal artery angiography and embolization* are indicated in:

- Persistent or recurrent hematuria.
- Arterio-venous fistula (AVF) e.g. after renal surgery or biopsy.
- An alternative to surgery in poor risk patient.

### *Classification*

[Minor 1, 2 (90%), Major 3,4, Vascular 5]

Grade 1 Contusion or subcapsular hematoma.

Grade 2 Superficial cortical laceration (< 1cm deep).

Grade 3 Deep cortical laceration (> 1cm deep).

Grade 4 Cortico-medullary laceration into collecting system or Segmental vessel.

Grade 5 Shattered kidney or renal pedicle injury.

### *Complications:*

1. Delayed bleeding.
2. Hypertension – AVF
3. Urinary fistula.
4. Hydronephrosis.
5. Abscess

### *Management:*

## Urinary Tract Infection

### I- Conservative treatment (90% of cases).

- Bed rest, IV line.
- Analgesics.
- Pulse & BP charts.
- Antibiotics to prevent infection of the hematoma.
- Urine samples collected to assess progress of bleeding.
- Blood transfusion if necessary.

### II- Surgical exploration:

#### Indications:

1. Persistent renal bleeding:
2. Pulsatile or expanding hematoma, -
3. Avulsion of renal artery or vein by CT
4. Penetrating trauma:

#### Surgical exploration:

##### Technique:

1. Midline transperitoneal approach.
2. Reconstruction.
3. Nephrectomy

## URETERAL TRAUMA

### Causes:

- 1- Iatrogenic damage is the common
- 2- Gynecologic: Hysterectomy, anterior colporrhaphy, ovarian cystectomy.
- 3- Intestinal: Sigmoid colectomy, A-P resection of rectum.
- 4- Urologic: Ureterolithotomy, ureteroscopy, open prostatectomy.
- 5- Vascular: Repair of aortic aneurysm.

### Clinical Features:

- A. Intraoperative diagnosis e.g. urine leaks as a clear fluid in the pelvic cavity.
- B. Delayed diagnosis postoperatively:
  1. *Ligation of one ureter* - hydronephrosis and subsequent renal atrophy: fever, loin pain.
  2. *Bilateral ureteric ligation* - Anuria.
  3. *Urine leakage from a divided ureter*:

#### a. Intraperitoneal urine:

## Urinary Tract Infection

- Sterile urine: Tachycardia, fever, ileus, signs of intraperitoneal fluid.
- Infected urine: Peritonitis, septicemia.

### **b. Extra peritoneal urine:**

- Mass in the pelvis or the loin.
- Leakage from wound, drain or vagina.

### **Diagnosis:**

1. Intraoperative urine leakage.
2. IVP: Non-function, hydroureter or leakage from site of injury.
3. Cystoscopy & retrograde ureterography to identify site of ligation or leakage.

### **Treatment:**

1. *At the time of operation:* Immediate repair by end-to-end anastomosis or re-implantation into bladder.
2. *Within 5 days*, in a stable patient: Immediate re-exploration and repair.
3. *After 5 days*, in a debilitated patient: Control urine leakage with temporary PCN or stenting and wait 3 months.
4. *Delayed reconstruction for complications* such as ureterovaginal fistula, ureteric strictures.

## **II. Lower urinary tract trauma**

### **Bladder Injuries**

### **Etiology:**

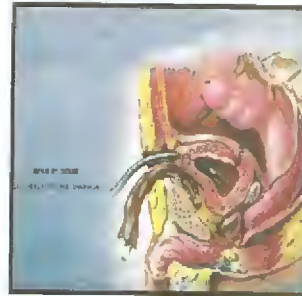
#### **1. External force (most common):**

#### **2. Iatrogenic injury:**

- a. Gynecologic operations
- b. Extensive pelvic procedures.
- c. Hernia repair.
- d. Transurethral operations.



Bladder Trauma



REPAIR

**Clinical findings:**

**1. Symptoms:**

- History of trauma
- Usually the patient is:
  - Unable to void.
  - When spontaneous voiding hematuria.
- Pelvic or lower pain.

**2. Signs:**

- Pelvic fractures accompany bladder rupture in 90% of cases.
- Evidence of external injury.
- Tenderness at the lower abdominal area.
- Heavy bleeding associated with pelvic fracture may result in shock.
- In rectal examination, landmarks may be indistinct because of a large pelvic hematoma.

## Urinary Tract Infection

### 3. Laboratory findings:

Detect microscopic hematuria.  
Urine culture.

### 4. Radiological findings:

Plain x-ray: fracture pelvis.  
Cystography: (Diagnostic)

- Use 300 mL contrast.
- One film when the bladder is full.
- 2nd film after evacuation of the bladder.
- Determine the site of bladder injury.

### Complications:

1. Pelvic abscess.
2. Peritonitis.
3. Partial incontinence may result from bladder injury if the laceration extends into the bladder neck.

### Treatment:

#### 1. Emergency treatment:

Shock and hemorrhage should be treated.

#### 2. Extra peritoneal bladder rupture:

- Can be successfully managed by urethral catheter drainage only (10 days).
- Large blood clots in the bladder or injuries involving the bladder neck should be managed surgically.

#### 3. Intraperitoneal bladder rupture:

- Should be repaired by transperitoneal approach.
- The bladder tear should be repaired from inside.

#### 4. Pelvic fracture:

- Stable pelvic fracture → ambulation within 4 to 5 days.
- Unstable fracture → required external.

#### 5. Pelvic hematoma:

- Should not be interrupted.
- If heavy bleeding persists → packing of the pelvis with laparotomy tubes often controls the problem.



**Prognosis:**

With appropriate treatment, the prognosis is excellent.

**Injuries to the Urethra**

- Occur most often in men and rare in women.
- The urethra can be separated into 2 anatomic divisions:
  1. The posterior urethra consisting of prostatic and membranous portions.
  2. The anterior urethra, consisting of the bulbous and pendulous urethra.

**Injuries to the Posterior Urethra**

**Etiology:**

Pelvic fracture.

**Clinical findings:**

**1. Symptoms:**

- History of trauma.
- Lower abdominal pain.
- Inability to urinate.

**2. Signs:**

- Blood at the external meatus (most important sign).
- Suprapubic tenderness.
- Perineal or suprapubic contusions.
- Rectal examination  $\phi$  may reveal a large pelvic hematoma with the prostate displaced superiorly (partial disruption of the membranous urethra is not accompanied by prostatic displacement).

**3. Radiological findings:**

- Plain x-ray: pelvic fracture.
- Ascending urethrogram: (Diagnostic)

**Treatment:**

**1. Emergency measures:**

For shock and hemorrhage.



## Urinary Tract Trauma

### 2. Immediate management:

Fixation of suprapubic tube either percutaneous or via small lower abdominal incision.

### 3. Urethral reconstruction:

#### a) Immediate:

Some prefer to align the urethra immediately.  
Persistent bleeding and laceration

#### b) Delayed:

- Three months after bladder drainage.
- Combined cystourethrogram should be done to determine the exact length of the resulting *urethral stricture*.
- Excision of the strictures area with anastomosis of the apex of the prostate.
- A urethral catheter should left in place with the suprapubic tube for one month.

## Injuries to the Anterior Urethra

### Etiology:

1. Straddle injury.
2. Self instrumentation.
3. Iatrogenic instrumentation.

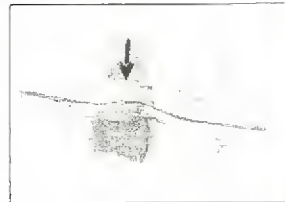
### Clinical findings:

#### 1. Symptoms:

- History of trauma.
- Urethral bleeding.
- Local pain in the perineum.
- If voiding has occurred and extravasation is noted → sudden swelling in the area will be present.
- If diagnosis of extravasation has been delayed → sepsis and sever infection may be present.

#### 2. Signs:

- Tender perineum and mass may be found.
- The patient usually has the desire to void but this should not be allowed.



## Urinary Tract Trauma

- If the presentation of such injuries is delayed, there will be massive extravasation.

### Radiological findings:

- Urethrogram (Diagnostic)
- It demonstrates extravasation and the location of injury.

### Complications:

- Heavy bleeding.
- Sepsis and infection if extravasations occur.

### Treatment:

#### 1. General measures:

- For shock & hemorrhage.
- If severe bleeding persists → perineal compression should be done.

#### 2. Specific measures:

##### a) Urethral contusion:

- No evidence of extravasation by the urethrogram.
- The patient is encouraging to void.
- If urethral bleeding persists urethral catheter should be fixed.

##### b) Urethral location:

- Instrumentation should be avoided.
- Fixation of suprapubic tube for bladder drainage.
- If minor extravasation is noted on the urethrogram, voiding study can be performed within 7 days.
- In extensive injuries, we must wait 2 to 3 weeks before doing the voiding study.
- Healing at the injuries site may result in stricture formation, but most of these strictures need no surgical interference.

##### c) Urethral laceration with extensive extravasation

Drainage of the areas involved must be done plus antibiotic therapy.

##### d) Immediate repair:

Could be done but with high incidence of complications.

#### 3. Treatment of complications:

## Urinary Tract Trauma

Strictures at the site of injury may be extensive and need delayed reconstruction. Or short and treated by visual internal urethrotomy

## Urinary Tract Infection

### Definitions:

The definitions of bacteriuria and pyuria are as follows:

#### *Significant bacteriuria in adults:*

1.  $\geq 10^3$  uropathogens/ml of midstream urine in acute uncomplicated cystitis in female;
2.  $\geq 10^4$  uropathogens/ml of midstream urine in acute uncomplicated pyelonephritis in female;
3.  $\geq 10^5$  uropathogens/ml in midstream urine of women or  $10^4$  uropathogens/ml of midstream urine in men (or in straight catheter urine in women) with complicated UTI.

**Bacteriuria** In a suprapubic bladder puncture specimen any count of bacteria is relevant.

#### *Asymptomatic bacteriuria (ABU).*

ABU is defined as two positive urine cultures taken more than 24h apart with  $10^5$  uropathogens/ml of the same bacterial strain (mostly only the species is available).

#### *Pyuria.*

The requirement for pyuria is 10 white blood cells per highpower field (400) in the resuspended sediment of a centrifuged aliquot of urine or per mm<sup>3</sup> in unspun urine. For the routine a dipstick method can also be used, including leukocyte esterase test, haemoglobin and probably nitrite reaction.

**Cystitis** describes a clinical syndrome associated with dysuria, frequency, urgency, and occasionally suprapubic pain. These symptoms, although generally indicative of cystitis, may also be associated with infection of the urethra or vagina or noninfectious conditions such as interstitial cystitis, bladder carcinoma, or calculi. Conversely, patients may be asymptomatic and have infection of the bladder and possibly the upper urinary tract.

## Urinary Tract Trauma

**Bacterial nephritis** should be reserved for interstitial renal inflammation primarily caused by the immediate or late effects of bacterial infection in the renal parenchyma.

**Pyelonephritis** refers to bacterial nephritis involving the renal parenchyma and collecting system

**Acute pyelonephritis** refers to a clinical symptom complex or pathologic lesion characterized by fever, chills, flank pain, and/or tenderness that is always associated with urinary tract infection

**Chronic pyelonephritis** describes a shrunken, scarred kidney that can only be diagnosed when there is post infectious morphologic, radiologic, or functional evidence of renal disease, but it need not be associated with urinary tract infection at the time of study.

**Acute prostatitis** is a febrile urinary tract infection associated with prostate tenderness and swelling and irritative voiding symptoms.

**Chronic bacterial prostatitis** is a subtle condition characterized by recurrent relapsing urinary tract infections caused by persistence of the pathogen in the prostatic secretory system in between courses of antimicrobial therapy.

**Nonbacterial prostatitis** refers to an inflamed prostate without bacterial infection.

Infections occurring in a functionally and anatomically normal urinary tract and a healthy host are considered *simple* or *uncomplicated*

Infections occurring in a urinary tract that is functionally or anatomically abnormal or in a compromised host are considered complicated

An **unresolved infection** is one that has not responded to antimicrobial therapy.

A **recurrent infection** is one that occurs following documented, successful resolution of an antecedent infection

### Routes of Infection:

1-**Ascending Route** : from fecal reservoir

## Urinary Tract Trauma

### 2-Hematogenous Route

### 3-Lymphatic Route

4- extension from neighbouring organs

5- Iatrogenic

6-Infected focus in the body as prostate and kidney

### ▪ Causative organisms

1-Bacteria :

2-Parasitic Bilharziasis

3-Echinocochus granulosis (Hydatid cyst)

4-Protozoa: Trichomonas vaginalis (*Candida albicans* originate in the flora of the vagina or perineal skin.

5-Helmenthic Pin worms or Enterobium.

### a- Specific

Means bacteria causing granulomas with specific histopathology: as T B Bacilli, Syphilis.

### b- Nonspecific:

E coli (80%), klebsiella, proteus and enterobacter spp.

### Natural protective mechanisms

1. In the urine:

▪ Inhibitors of bacterial adherence

▪ PH: acidic

▪ Osmolality: Urea concentration Organic acid concentration

2. In the walls (urothelium)

3. Patency

4. Systemic

### Predisposing factors

1. Obstruction

2. Reflux

3. F.B (stones, catheters and stents)

4. Some diseases: diabetes mellitus

### Diagnosis

▪ Collection of urine for culture:

1. Midstream in adult males

2. Urethral catheter in females

3. In Neonates and children by SP aspiration

## Urinary Tract Infection

- Children, female, and adult male
- Significant UTI: > 100,000 organism per ml

### Clinical picture

- 1- Asymptomatic bacteriuria
- 2- Urethritis (S.T)
- 3- Cystitis
- 4- Prostatitis {Acute, Chronic}
- 5- Pyelonephritis {Acute, Chronic}
- 6- Renal carbuncle
- 7- Perinephritis & Perinephric abscess
- 8- Paranephritis and paranephric abscess

## 1-Cystitis

### Clinical picture:

- Frequency
- Burning micturition
- Sense of non relief (strangury the same like dysentery). This is why a female suffering cystitis says that she doesn't micturate.
- Hematuria occurs with simple cystitis but this symptom must be taking seriously.

### Treatment:

- 1- Antibiotics
- 2- Analgesics
- 3- Bladder sedatives
- 4- Patients sedatives
- 5- In females: pay attention to sexual organs hygiene

## 2-URETHRITIS

Symptomatic urethritis is characterized by alguria and purulent discharge.

### Diagnosis.

The Gram stain of secretion or urethral smear showing more than 5 leukocytes per high-power field (HPF) (1,000) and



## Urinary Tract Infection

eventually gonococci located intracellularly as Gram-negative diplococci indicate a pyogenic urethritis. A positive leukocyte esterase test or more than 10 leukocytes per high-power field (400) in the first voiding urine specimen are diagnostic.

### Treatment:

- Antibiotic and analgesics
- Wash his hands if they get contaminated with this discharge because it may infect the eyes or oral cavity.
- Not to practice with his wife unless the discharge stops completely and the wife must take the same treatment simultaneously.

## 3-Prostatitis

### Classification of prostatitis according to NIDDK/NIH

- I. Acute bacterial prostatitis (ABP)
- II. Chronic bacterial prostatitis (CBP)
- III. Chronic pelvic pain syndrome (CPPS)

Because the prostate and the kidneys are parenchymatous organs enclosed in a fibrous capsule that doesn't expand acutely, acute infections in these organs cause high fever, rigors severe toxemia and pain. The difference in that pain in the kidney is renal and in the prostate is pelvic, perineal and or S. P and could be accompanied by acute retention or severe difficulty

- In acute prostatitis and acute pyelonephritis we give potent antimicrobial drugs and in most of the cases it resolves. In some cases abscess occurs or the condition turns to chronic. If abscess we drain either perineally or transurethrally.
- Chronic prostatitis and chronic pyelonephritis we give chronic suppressive therapy.

## 4-Renal Abscess

- Renal abscess could be multilocular (carbuncle).

## Urinary Tract Infection

- It must be differentiated from renal tumours and when the diagnosis becomes sure, percutaneous or open drainage should be adopted

### *Perinephritis and perinephric Abscess*

- This is usually an extension from severe renal infection or suppuration. It is within zucker kandle fascia. If pus is diagnosed drainage must<sup>b</sup> be accomplished. Diabetes mellitus must be excluded.
- This is usually an extension from vertebrae or neighboring organs or from perinephric abscess after rupture of Zucker Kandle fascia. In the first condition Pot's disease of the vertebrae must be excluded.

### **Complications**

- Renal damage: due to Recurrent pyelonephritis, stones and obstruction
- Epididymo-orchitis: in men over 50 ys
- Septicemia: predisposing cause as renal stones, urethral catheter and BOO

## Obstructive nephropathy (Hydronephrosis)

### Causes

#### I- Acute obstruction

Ureteric obstruction due to

- Stone.
- Blood clots.
- Ligature.
- Fungus ball.

#### II- Chronic obstruction

##### At the level of the kidney

- Congenital: Pelviureteral junction obstruction.
- Inflammatory: Urinary TB.
- Neoplastic: Renal cell carcinoma, TCC of renal pelvis.
- Calcular: Stones in renal pelvis.

##### At the level of the ureter

- Congenital: Ureterovesical junction obstruction, VUR, Ureterocele, ectopic ureter, Megaureter.
- Inflammatory: TB. Schistosomiasis.
- Neoplastic :
  - Internal: ureteric tumor
  - External: retroperitoneal fibrosis, masses.
- Calcular: The most common

##### At the level of the bladder Neck :

- Congenital: Bladder neck obstruction.
- Inflammatory: TB. Schistosomiasis.
- Neoplastic: Bladder tumors.
- Calcular: Bladder stones.
- Miscellaneous : Neurogenic bladder

##### At the level of the urethra :

- Congenital: Posterior urethral valves, Meatal stenosis.
- Inflammatory: Gonorrhea, TB.
- Neoplastic: Tumors.
- Calcular: Stones.
- Traumatic: Stricture urethra.

## Obstructive nephropathy

- Extrinsic pressure: BPH, prostate cancer, fibrous prostate.

### Diagnosis

- History.
- Clinical examination (renal mass).
- Investigation :

\*Laboratory : Urine analysis, serum creatinine.

\*Radiological : 1- KUB alone is of limited value

2- US

3- SPIRAL CT

4- IVP has a *Functional and*

*Anatomical importance*

5- Diuretic renogram.

6- Retrograde pyelography.

7- Antegrade pyelography

8- Whitaker test

9- MRU.

### Degree of hydronephrosis

#### Classification The degree of hydronephrosis :

I- Loss of cupping.

II- Clipping

III- Rounding of the calyces with obliteration of the shadows of the papillae.

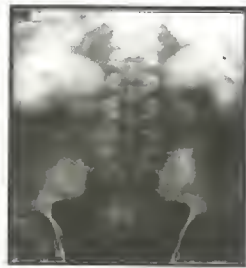
IV- Sac like collecting system with loss of renal parenchyma.

### Limitations:

-Nephrotoxicity.

-Allergy.

-Radiation exposure.



*Advanced hydronephrosis*



*Hydronephrosis with clubbing*

## Obstructive nephropathy

### *Ante and Retrograde pyelography:*

**Value:** Anatomical information

**Limitations:**

- No functional information
- Invasive technique

### **MRU:**

**Value:**

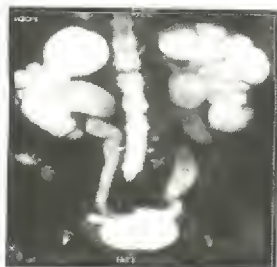
- Anatomical and functional information
- Noninvasive

**Indications:**

When IVP is contraindicated:

- Renal impairment
- Pregnancy

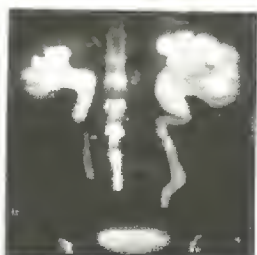
**Limitations:** Expensive



*Advanced hydronephrosis*



*Obstructed Rt Ureter*



### Treatment

Obstruction and hydronephrosis are not synonymous. A patient may have a dilated renal collecting system but not have a true obstruction. In addition, one must distinguish whether the hydronephrosis is secondary to an ongoing obstruction (in which case there is concern for progressive renal deterioration) or secondary to a prior obstructive event that both occurred and resolved antenatally (in which case further renal damage is less likely). In the former, surgical treatment to correct the obstruction is often necessary to preserve renal function; in the latter, surgical treatment is often unnecessary.

We should direct the treatment to the cause of obstruction:

PUJO

Ureteral stone or obstruction

BPH or prostate cancer

Urethral strictures etc

## Adult Renal Tumors

### I- Primary

- Benign
- Malignant

### II- Secondary tumors as:

- Hematogenous tumors : ( Leukemia- Lymphoma)
- Lung Cancer

## 2- Malignant Renal Tumors

### A- Renal cell carcinoma (RCC)

#### Epidemiology

Renal adenocarcinoma is the 10th most common cancer, accounting for 3% of all malignancies in adults, with a median age at diagnosis of 65 years.

**Etiology:** The cause is unknown.

#### Pathology:

1- Site of origin : proximal renal tubules (microvilli)

#### 2- Macroscopic:

Pseudocapsule (compressed surrounding parenchyma).  
Yellow in color.  
Heterogeneous cut section (Hemorrhage & necrosis).

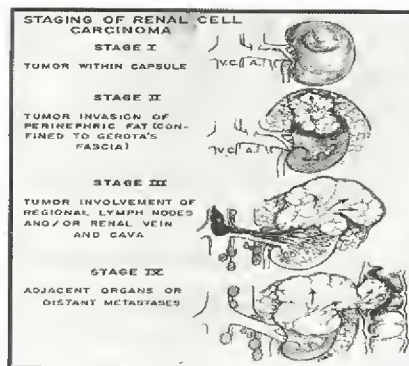
#### 3- Microscopic

▪ Histological subtypes :

- Conventional (clear cell) → 70-80%
- Papillary → 10-15%
- Chromophobe → 4-5%



## Adult Renal Tumors



### Staging:

- Robson (1963)
- TNM (1997)

### Spread:

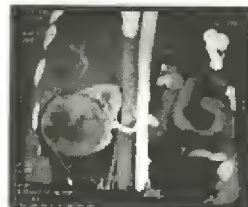
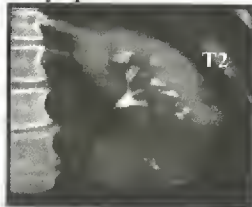
#### 1- Local:

- a) Renal capsule → perinephric fat → adjacent organs.
- b) Renal vein (tumor thrombus).
- c) Surrounding organs

#### 2- Hematogenous:

- 25% of patients had metastasis at time of diagnosis.
- The most common sites :
  - \* Lung \* Liver. \* Bone (osteolytic)

#### 3- Lymphatic.



## Adult Renal Tumors

### Symptoms:

- 1- **Many renal masses remain** asymptomatic and non-palpable until late in the natural course of the disease
- Many renal masses remain asymptomatic and non-palpable until late in the natural course of the disease

2- **The classic triad** of flank pain, gross haematuria and palpable abdominal mass is now rarely found (6-10%)

3- **Symptoms of metastasis** 25-30% of patients are diagnosed due to symptoms associated with metastatic disease.

4- **Paraneoplastic syndromes** are found in around 30% of patients with symptomatic RCC.

**Physical examination:** Physical examination has a limited role in diagnosing RCC

**Laboratory:** The most commonly assessed laboratory parameters are haemoglobin, erythrocyte sedimentation rate, alkaline phosphatase and serum calcium

### Radiology:

1- **Ultrasonography (US): 85% diagnostic**

Can differentiate renal cyst from mass.

2- **IVU:** Patients presented primary with hematuria should undergo IVU.

3- **CT: (98% diagnostic):**

- It is the primary technique for evaluation of renal mass detected on IVU or US.

It serves to verify the diagnosis of RCC and provides information on the function and morphology of the contralateral kidney

4- **Magnetic resonance imaging (MRI):**

Equivalent to CT in staging.

- More superior in the evaluation of tumor thrombus extension in the IVC

5- **Bone scan:**

## Adult Renal Tumors

- In patients suspected to have bone metastasis (Bone pain, high alkaline phosphatase).

### 6- Chest x-ray:

- Routine preoperative evaluation.
- If suspicious → chest-CT scan.

### 7- Renal angiography:

- Limited role after CT.
- Invasive

### 8- Fine needle aspiration: (< 2%).

- Limited role in RCC.
- Indicated in metastatic renal tumors who are not candidates for surgical treatment.

## *Treatment of Renal tumors*

### 1- Localized to the capsule:

- a- Radical Nephrectomy: (open or laparoscopic)

#### b- Embolization

Indications for tumour embolization include patients with gross haematuria who are not fit for surgical

### c- Nephron-sparing surgery:

Indicated in :

- 1- Solitary kidney.( absolute)
- 2 Bilateral disease.( relative)
- 3- CRI
- 4- Tumor <4 cm with normal other kidney.( elective )

### d- Laparoscopic nephrectomy:

### 2- Locally advanced Renal tumours:

Palliative Nephrectomy.  
Total renal angio-infarction (If not operable)-  
Then palliative radiotherapy.

### 3-Surgical treatment of metastatic RCC (tumour nephrectomy)

1- Palliative Nephrectomy:± Excision of solitary metastasis.

#### 2- Radiotherapy for metastases in RCC

Radiotherapy can be used for selected symptomatic patients with non-resectable brain or osseous lesions who do not respond to other conservative treatment approaches

#### 3- Biologic Response Modifiers:

Interferon-α

Interlukin-2

#### 4-Chemotherapy:

RCC is chemo resistant.

#### Prognosis:

<i>Stage</i>	<i>5-year survival</i>
I	90-100%
II	75-95%
III	60-70%
IV	15-30%

## Renal Pelvis Tumors

#### **Epidemiology:**

- 10% of renal tumors & 5% of all urothelial tumors.

#### **Histological types**

- TCC (Commonest 90 – 97%).
- SCC (rare < 10%).
- Adenocarcinoma (very rare).

#### **Symptoms:**

- 1- Gross hematuria (70- 90%)

## Adult Renal Tumors

- 2- Flank pain due to ureteral obstruction.
- 3- Irritative voiding symptoms.
- 4- Symptoms of metastasis.

### Signs:

- 1- Flank mass (either hydronephrosis or renal mass)
- 2- Flank tenderness.
- 3- Supraclavicular or inguinal Lymph node enlargement.

### Laboratory:

- 1- Hematuria (Microscopic)
- 2- Pyuria & Bacteriuria.
- 3- Elevated liver enzymes.

### Cytology:

Detection of malignant cells in urine samples aspirated from the ureter or pelvis of the affected side

### Imaging:

#### (1) IVU:

- Intraluminal filling defect.
- Unilateral non visualization of the pelvicalyceal system.
- Hydronephrosis of calyceal group.

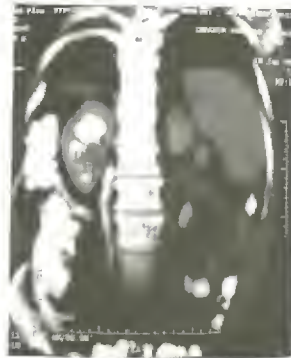
#### (2) US, CT, MRI:

- Helpful in detection of soft tissue mass in the renal pelvis.
- Used in differential diagnosis of filling defects.



## Adult Renal Tumors

### (3) Retrograde uretero-pyelography to detect SOL



#### Differential diagnosis:

##### (1) Filling defect in pelvicalyceal system:

- Lucent stone.
- Papillary necrosis.
- Fungus ball.
- Tuberculous granuloma
- Blood clot.
- Fibroadenomatous polyp.
- Ureteritis cystica.

##### (2) Renal parenchymal tumor

#### Treatment: of ureteral tumors :

##### (1) Nephroureterectomy and excision of bladder cuff

It is the standard treatment for tumor in the renal pelvis or upper ureter open or laparoscopic.

##### (2) Segmental ureterectomy and ureterovesical reimplant is indicated for distal ureter tumors.





## Pediatric Oncology

### The most important

1. Wilm's tumour
2. Neuroblastoma
3. Rhabdomyosarcoma

### **1-Wilms' tumour** **(Nephroblastoma)**

The most common urinary malignancy of the childhood.

- 90% of cases present before the age of 7 yr.
- Mean age: 3½ yr.

#### Pathology:

##### Gross picture:

- Encapsulated tumour (Pseudocapsular)
- Develop at any part of the kidney.
- Has areas of
  - Cystic degeneration
  - Necrosis and hemorrhage.

Renal vein invasion in 20%.

##### Microscopically:

- Nephrogenic cells arranged in tubuloglomerular pattern.
- Stromal background may be muscle, fat, cartilage...etc.

##### Histological types

###### **(A) Unfavourable (10%)**

1. Anaplasia.
2. Rhabdoid tumour.
3. Clear cell sarcoma.

###### **(B) Favourable**

1. Multilocular cysts.
2. Congenital mesoblastic nephroma.
3. Renal Rhabdomyo Sarcoma.

**Staging:**

**Stage (I)**

- Limited to the kidney.
- Completely resected.
- No residuals beyond the resection margin.

**Stage (II)**

- Extends beyond the kidney
- Completely resected
- $\pm$  L.N
- $\pm$  Renal vessels invasion.

**Stage (III):**

- Gross residuals beyond resection site.
- Biopsied tumour
- Ruptured tumour.

**Stage (IV)**

Haematogenous spread to: lung, liver, bone or brain.

**Stage (V)**

Bilateral Wilms' tumour.

**Presentation:**

- Abdominal mass 75%
- Abdominal pain 30%
- Hematuria 25%
- Hypertension 25-60%.

**Differential Diagnosis:**

- Hydronephrosis.
- Neuroblastoma.
- Retroperitoneal Sarcoma.
- Renal cystic disorders.

**Spread:**

- Blood: Lung, Liver, Bone, Brain.
- Rhabdoid type: Brain metastasis.
- Clear cell sarcoma: Bone metastasis.

**Investigations:**

1. Ultrasonography.
2. Abdominal CT and/ or MRI.

- Metastasis survey:
  - Chest x-ray
  - Bone scan
  - Brain scan

**Treatment tools:**

- Wilms' is chemo and radiosensitive
- The traditional treatment involves nephrectomy followed by chemotherapy

**Treatment tools:**

**1- Surgery:**

Nephrectomy

**2- Chemotherapy**

- Pre-operative in huge tumours.
- Post-operative routine in all stages.

**3- Radiotherapy**

**Post-operative in:**

- Stage III, IV (Favourable types)
- All stages (unfavorable types)

**Pre-operative in:**

- Unresectable tumours.

## **2- Neuroblastoma**

**Epidemiology:**

- The most common malignancy of infancy.
- Age: younger than Wilms' (2-4 yrs.)

**Origin:**

- Develops from cells of the neural crest so, it may arise anywhere along the sympathetic chain.
- The commonest site is adrenal glands.

**Stages:**

- I. Tumour confined to the organ of origin.
- II. Extends beyond organ of origin but it does not exceed midline.
- III. Tumour crosses the midline.
- IV. Metastatic.
- V. Stage I or II plus, liver, skin or Bone marrow involvement.

## Pediatric Oncology

### Clinical presentation:

1. Abdominal mass.
2. Manifestations of metastasis  
e.g: fever, malaise, anorexia...etc.
3. Picture of catecholamines release  
e.g.: diarrhea, headache, sweating, hypertension pallor, palpitation...etc.

### Diagnosis:

#### **A) Lab.:**

- Blood picture
- Bone marrow aspirate.
- Blood and Urinary catecholamines detection.

#### **B) Radiology.:**

- Ultrasound.
- IVP
- CT and or MRI.

### Treatment:

1. Surgery: for early stages.
2. Chemotherapy & Radiotherapy:
  - Pre-operative in case of huge tumours
  - Post-operative.
3. Rhabdomyosarcoma

### Origin:

- Any part of the body contains embryonal mesenchyme.
- Genito urinary sites:
  - *Bladder.*
  - *Prostate.*
  - *Vagina*
  - *Para testicular structures.*

### Stages:

#### **I - Localized tumour**

- Completely respectable without residuals.

#### **II - Regional disease**

- Grossly respectable but there is microscopic residual.

#### **III - Incomplete resection.**

## Pediatric Oncology

- Living gross residual

### IV - Metastatic tumour.

#### Presentation:

- Mass.
- Hematuria.
- Lower urinary obstruction.
- Bloody foul odoured discharge.
- Prolapse the organ of content (Sarcoma botryoids).

#### Diagnosis:

1. Clinical presentation
2. Radiology:
  - *Ultrasound of the pelvis.*
  - *Pelvi-abd. CT or MRI.*
3. Endoscopy
4. Biopsy and histology

#### Treatment:

- Biopsy to verify the pathology then  
Chemotherapy ± Radiotherapy.
- Surgery.
- Post-operative chemotherapy.

## Bladder Cancer

### Incidence:

The bladder is the most common site of cancer in the urinary tract

- Age and sex: Male : Female 2.5 : 1
- Bilharzial : 3rd-5th decades.
- Non bilharzial : 5th- 6th decades..
- In Egypt: Farmers.
- Abroad: Aniline workers.

### Etiology

1-Bilharziasis:

2-Smoking

2- Aromatic amines: "Aniline":

### I- Gross appearance

Bilh.	Non. Bilh.
- Nodular fungating	- Papillary
- Papillary	- Nodular
- Ulcerative	- Ulcerative
- Fibrillary	

### II- Microscopic Examination

Bilh.	Non. Bilh.
- S.C.C. 50-60%	- T.C.C. 80-90%
- T.C.C. 40-50%	- S.C.C. 5-10%
- Adenocarcinoma 2%	- Adenocarcinoma 2%

Sites of the tumor

## Bladder Cancer

1- Post wall :	35%
2- Lateral wall :	30%
3- Anterior wall :	25%
4- Vault :	5%
5- Trigone :	5%

### Metastases

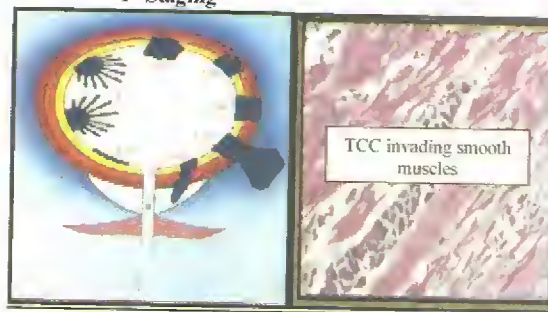
1. Direct spread to surrounding organs
2. Lymphatic spread to obturator, hypogastric, common iliac, and presacral.
3. Blood dissimulation to different organs

### Complications

1. Metastasis.
2. Ureteral obstruction → uraemia.
3. Bleeding.

### Staging (TNM)

#### *T- Staging*





### TNM Staging

#### **Clinical picture**

##### **1-Malignant cystitis**

- Irritative bladder symptoms: BM, FREQUENCY, hematuria, necrotic urea, not relieved by medications

##### **2- Symptoms of metastases.**

##### **3-DRE**

- T1: Not felt by DRE.
- T2: Indurated bladder base, smooth
- T3: Irregular Indurated bladder base, bladder is mobile
- T4: Irregular fixed mass in bladder base, bladder is fixed

#### **Investigations**

##### **1- Lab:**

- Serum creatinine.
- CBS.
- Liver Function.
- Blood Sugar.
- Urine cytology.
- DNA cytoflowometry.

##### **2- Cystoscopy, EUA, Biopsy.**

- Cystoscopy under local anesthesia.
- If the tumor is diagnosed: Imaging, EUA, Bladder wash, Biopsy.
- Superficial bladder tumor: IVP may be used to evaluate upper tract. However, CT or MRI is more accurate.

##### **3-Radiology**

- a- KUB, US, IVP. (Cystography: Irregular filling defect,)

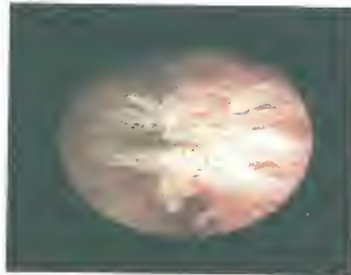
B-Computed tomography (CT)

C- Magnetic resonance imaging (MRI)

D-CT: Stage bladder tumour.

## Bladder Cancer

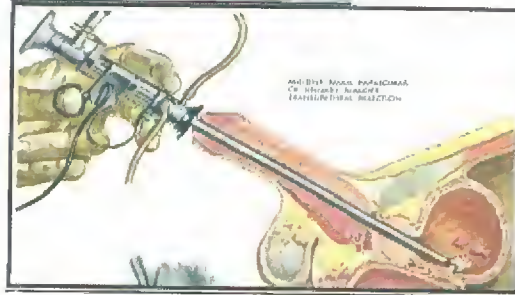
F-Bone scans for bony metastases.  
Typical long funded tumour



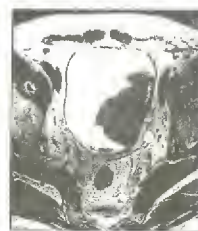
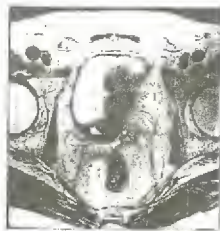
Discrete small papillary tumour



T3 tumour in the bladder



3- EUA, cystoscopy, Biopsy: Bimanual Examination under spinal anaesthesia , panendoscopy and biopsy from the edge of the lesion



*AXIAL T2 MRI: T4a N2 bladder tumor*

**Treatment of Bladder cancer**

**I: Superficial bladder cancer**

**Intravesical Chemotherapy**

- Adjunctive to TUR to prevent tumor cell implantation.
- Prophylactic to prevent the recurrence and/or progression.
- Therapeutic after incomplete TURBT.
- Mitomycin C, Thiotepa, Adriamycin and Epirubicin.
- Most agents are given weekly for 6 weeks followed by monthly dose for 1-2 years.
- Side effects: Chemical cystitis, systemic absorption.

**Intravesical Immunotherapy**

- BCG (Attenuated strain of mycobacterial Bovis).
- Effective treatment in CIS and prevention of tumor recurrence.
- Side effects: cystitis, hematuria, prostatitis and lymphadenitis.

**Treatment of Invasive Bladder Cancer**

**A) Surgery: -**

**a- Radical cystectomy + urinary diversion.**

Gold standard for treatment of invasive bladder cancer.

- Over all survival is 50-60%.

**b- Partial cystectomy:**

- Rarely indicated in current urologic practice.

**B-Radiotherapy:**

- External beam irradiation (5000-7000 CGy).
- Alternative to radical cystectomy when surgery is contraindicated (in TCC only).
- Side effects include radiation injury of the bowel, rectum, bladder and the skin.
- 5 year survival is 20-40% in invasive bladder tumors.

**C-Chemotherapy:**

- Systemic chemotherapy alone can not cure bladder cancer.
- Used mainly in (transitional cell carcinoma TCC).
- Squamous and adenocarcinomas are chemo resistant.
- The effective drugs include: Cisplatin, Methotrexate, Adriamycin and Gemcitabin.

## Bladder Cancer

### Metastatic Bladder Cancer

- No curative therapy for advanced disease
- The treatment is palliative.
- Prognosis is poor.

## Urinary Diversion

It is the method by which the patient can get rid of the urine rather than normal urinary tract.

### Types of Diversion

#### *Incontinent diversion:*

- The urine flow is controlled and collected in an appliance fixed to a stoma in the abdominal wall.

#### *Continent diversion:*

- The patient can evacuate the urinary reservoir voluntarily (on his own desire).

### Techniques and Principles of Urinary Diversion

1. Exteriorization of a part of the urinary tract and anastomosed to the skin (e.g. end Ureterostomy).
2. Use of short segment from the ileum or the colon between the ureters and the skin stoma (e.g. ileal loop conduit).
3. Creation of a urinary reservoir (pouch) made from the intestine to which the ureters are implanted with an antireflux technique.

### Continence Mechanisms in Continent Urinary Diversion

1. External urethral sphincter (orthotropic neobladder).
2. Anal sphincter (rectal bladder or ureterosigmoidostomy).
3. Continent valve connect the pouch to the skin. Evacuation is done by passing a catheter through the valve.

### Complications of Urinary Diversion

1-Resulting from exclusion of part of intestine from the GIT. E.g. diarrhea, malabsorption syndrome.

## Bladder Cancer

2-Resulting from incorporation of a part of bowel into the urinary tract: metabolic acidosis, osteomalacia, infections, stone formation, and malignancy.

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E.g.

Zalouey

## Stone Disease

### Causes

#### Calcium oxalate stones

The most common type of kidney stone is composed of calcium oxalate crystals, and factors that promote the precipitation of crystals in the urine are associated with the development of these stones.

#### Other types

The formation of struvite stones is associated with the presence of urea-splitting bacteria.

The formation of uric acid stones is associated with conditions that cause high blood uric acid levels, such as gout, leukemias/lymphomas treated by chemotherapy (secondary gout from the death of leukemic cells), and acid/base metabolism disorders.

The formation of calcium phosphate stones is associated with conditions such as hyperparathyroidism and renal tubular acidosis.

The formation of cystine stones is uniquely associated with people suffering from cystinuria, who accumulate cystine in their urine.

- Higher in those who live in mountains, desert, or tropical areas.
- Higher in those who live in mountains, desert, or tropical areas.
- Increased water intake and increased urinary output decrease the incidence of urinary calculi in those patients who are predisposed to the disease.
- Much more likely to be found in individuals who have sedentary occupations.



## Stone Disease

- Especially with urea splitting organism which produces stones formed of Ca, magnesium and ammonium phosphate.

**Others**

- Immobilization,
- Medullary sponge kidney
- Vit A deficiency

### Role of stone matrix

- Kidney stones are not simple crystalline masses they contain between 10% and 65% noncrystalline material or matrix, Matrix must originate in the renal tubules, probably in the proximal tubule.

### Clinical picture

#### *Symptoms*

**Colicky pain:** "loin to groin". Often described as the "worst pain ever felt".

**Hematuria:** due to damage to wall of ureter and/or urethra

**Dysuria:** when passing stones

**Oliguria:** obstruction of bladder or urethra by stone, or extremely rarely, simultaneous obstruction of both ureters by a stone.

**Nausea/vomiting:** embryological link with intestine — stimulates vomiting center

#### *Signs*

- **Fever:** if the kidney is infected
- **Tenderloin :** in obstruction

### Investigations

- **Laboratory:**
- Urine examination and culture for bacteria living in urine
- Random urine for cystine screening
- Full blood picture
- Kidney and liver function
- Blood for s uric acid, ca , Phosphorus and total protein

## Stone Disease

- Radiology.
- UTP: Radio opaque stone.
- Or in case of radiolucent stones we need IVP: radiolucent stones will appear as filling defects

Risk factors for the development of reduced renal function during IVP:

- Ultrasound:: can diagnose radiolucent stones.
- Spiral CT: an easy way to diagnose and localize stone.
- Isotope renogram: if there is any possibility of reduced renal function.

### Signs of ureteral obstruction

- UTP: radio opaque stone in the course of the ureter.
- 1 minute film: delayed appearance of nephrogram.
- 20 minute film: dilatation of ureter down to the level of stone.
- Common sites of obstruction.
- PUJ, Brim of the pelvis and VUJ.

Most patients pass their calculi spontaneously, only 30% required interference.

### Treatment

- I. Medical-Conservative.
- II. ESWL.
- III. Endoscopic.
- IV. Surgical.

### Medical management of stones

#### Indications:

- 1-Small less than 5 mm in diameter:  
Stones of less than 5mm will pass in 98% of cases
- 2- Peripheral = calyceal.
- 3-Single or multiple.± Asymptomatic = silent

#### Tools:

- 1-Analgesia :Adequate analgesia and sedatives
- 2-Bed rest
- 3-Restrict fluids

## Stone Disease

### **Uric acid stones**

Treated by

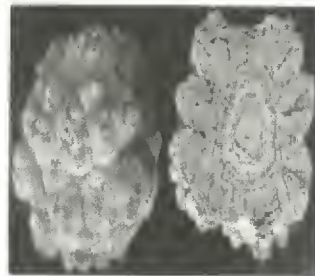
- 1- Alkalinization of urine.
- 2- Allopurinol 100mg.

This treatment will dissolve pre existing stones.

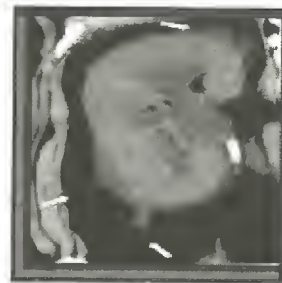
### **Infective stones**

- Usually require surgical removal
- Prevent recurrence by preventing re infection which depends on complete removal of stone
- Following stone surgery in this group antibiotics are given for 3 months

### **Surgical and endoscopic interference**



*Oxalate stone*



*Stone lumbar ureter—CT*

#### **Stone upper third ureter**

- Ureteroscopy
- Via PCNL
- Open surgery

#### **Middle and lower third ureter**

- Ureteroscopy
- Open

### **A- Percutaneous lithotripsy:**

**Indications:** 15-30%

#### **Complications**

##### **Early :**

- Bleeding.
- Avulsion.
- Hematoma.
- Stone remnant.
- Perforation.
- Urinoma.
- Electrolyte imbalance.

##### **Late :**

- Hemorrhage.
- Obstruction.
- Stone recurrence.

#### **Success Rate**

- |                       |                   |
|-----------------------|-------------------|
| - Success rate        | 95-98% (renal)    |
| - Success rate        | 88-95% (Ureteral) |
| - Residual stone rate | 0.6               |

### **B- Extracorporeal Shock Wave Lithotripsy**

Non contact, non invasive fragmentation of urinary stones into small fragments of sufficient size to pass spontaneously through the use of extracorporeal shock waves.

### **C-Open Surgery**

Ability to eradicate the stone with the least invasive modality. Holds that open surgery should be avoided unless else fails or is highly likely fails.

- 1) Stone burden > 2.5 cm.
- 2) Staghorn stones.

### Prevention

Preventive strategies include dietary modifications and sometimes also taking drugs with the goal of reducing excretory load on the kidneys.<sup>[3]</sup>

Drinking enough water to make 2 to 2.5 liters of urine per day.

A diet low in protein, nitrogen and sodium intake.

Avoiding excess Vitamin C, especially Vitamin C supplements.

Restriction of oxalate-rich foods and maintenance of an adequate intake of dietary calcium. There is equivocal evidence that calcium supplements increase the risk of stone formation, though calcium citrate appears to carry the lowest, if any, risk.

Taking drugs such as thiazides, potassium citrate, magnesium citrate and allopurinol, depending on the cause of stone formation.

For those patients interested in optimizing their kidney stone prevention options, it's essential to have a 24 hour urine test performed. This should be done with the patient on his or her regular diet and activities. The results can then be analyzed for abnormalities and appropriate treatment given.

## PROSTATE

### *Benign Prostatic Hyperplasia*

#### Age :

The prevalence increases from 18% for men in their 40s to 56% for those in their 70s decade.

#### Cause:

##### Apoptosis

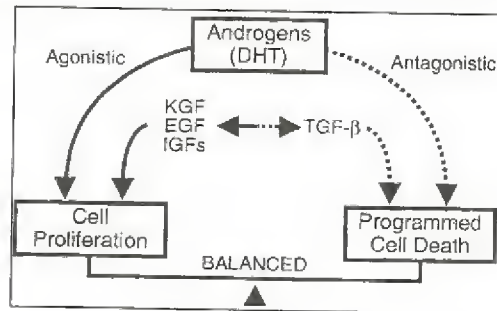
- Programmed cell death (apoptosis) is a physiologic mechanism
- After castration, active cell death is increased

##### Stromal-Epithelial Interaction

- BPH may be due to a defect in a stromal component that normally inhibits cell proliferation,

##### Growth Factors

- Growth factors are small peptide molecules that stimulate, or, in some cases, inhibit, cell division and differentiation processes
- Interactions between growth factors and steroid hormones may alter the balance of cell proliferation versus cell death to produce BPH



*Growth factors and Androgens*

### The Potential Role of Prostatic Inflammatory Cells

- An additional source of growth factors in human BPH tissue may be the inflammatory cell infiltrates seen in many prostate specimens.

### The Bladder's Response to Obstruction

#### *Two basic types:*

- 1- *Detrusor instability* or decreased *compliance*, which is clinically associated with symptoms of frequency and urgency,
- 2- *Decreased detrusor contractility*, which is associated with further deterioration in the force of the urinary stream, hesitancy, intermittency, increased residual urine

#### **Bladder changes**

- The initial response: hypertrophy---increased intravesical pressure and maintained flow ---- that lead to detrusor instability.
- Obstruction may modulate neural-detrusor responses-----lead to reduced bladder contractility, impaired central processing, and altered sensation

#### **Terminology**


- BPH: pathological term
- BNO: bladder neck obstruction
- BNI: bladder neck incision
- TURP: trans urethral resection of Prostate




## Benign Prostatic Hyperplasia

**Normal bladder and prostate**

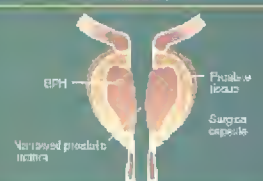
- BPH is the most common neoplasm in men
- Pathological changes of this disorder can be found in 50% of men in their 5th decade and in 90% of men in their ninth decade
- The aetiology of BPH is multifactorial but there are two essential prerequisites: the presence of testes and aging



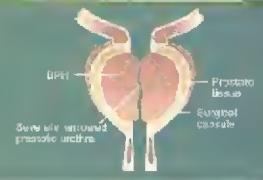
**Development of BPH : Early**  
Slide 1 of 3



**Development of BPH : Intermediate**  
Slide 2 of 3



**Development of BPH : Late**  
Slide 3 of 3



## DIAGNOSIS

### • SYMPTOMS

- Urinary frequency
  - The need to urinate frequently during the day or night (nocturia), usually voiding only small amounts of urine with each episode
  - Interrupted sleep to urinate at night
- Urinary urgency
  - The sudden urgent need to urinate quickly
  - The sensation of imminent loss of urine without control
- Hesitancy
  - Hesitant, interrupted, weak urinary stream
  - Difficulty initiating the urinary stream
  - Having to stand at or sit on the toilet for some time prior to producing a urinary stream
- Incomplete bladder emptying
  - The sensation of incomplete evacuation of urine from the bladder
  - The feeling of persistent residual urine regardless of the frequency of urination
- Straining - The need strain or push (Valsalva maneuver) to initiate and maintain urination in order to more fully evacuate the bladder
- Decreased force of stream - The subjective loss of force of the urinary stream over time
- Dribbling or dripping - The loss of small amounts of urine due to a poor urinary stream

The digital rectal examination (DRE) is an integral part of the evaluation for men with presumed BPH.

### Laboratory

- 1-Prostate-specific antigen (PSA) measurement
- 2-Urine analysis
- 3-Culture of urine
- 4-FBS : It is a common finding
- 5-Prothrombin concentration

## Benign Prostatic Hyperplasia

- 6-Bleeding and coagulation times
- 7-Blood picture
- 8-Kidney function :

### *Radiological investigations*

#### Upper urinary tract:

- UTP
- IVP
- US of abdomen to detect hydronephrosis and measure residual urine

#### Lower urinary tract :

Urinary bladder volume and PM residual urine and voiding cysto-urethrogram

#### Urethra

Retrograde urethrography gives only indirect information on the effect of benign prostatic enlargement (BPE) on adjacent structures.

#### Prostate

##### Choice of imaging modalities

- Transabdominal ultrasound
- TRUS

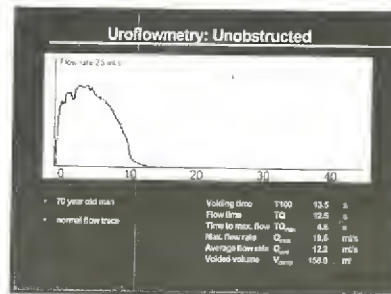
##### Post-void residual volume

Large PVR volumes (> 200-300 mL) may indicate bladder dysfunction and predict a less favourable response to treatment. Still, residual urine is not a contraindication to watchful waiting or medical therapy.

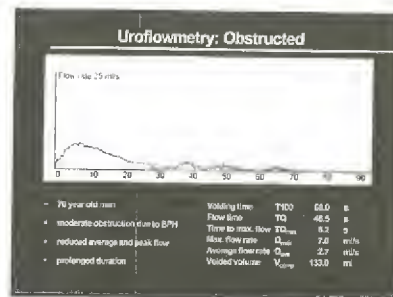
### *Measures of Obstruction*

- *Free flow rates ( uroflowmetry)*:provide at best an indirect measure for the probability of obstruction being present
- *Invasive pressure flow studies* can measure obstruction more precisely
- Postvoiding residual urine.

## Benign Prostatic Hyperplasia



Normal flow curve



Obstructed flow curve

### Complications of BPH

1. Bladder Stones
2. Urinary Tract Infections
3. Bladder Decompensation: with ultimate detrusor muscle failure
4. Urinary Incontinence; 6.1%
5. Upper Urinary Tract Deterioration and Azotemia
6. Hematuria; gross hematuria and form clots
7. Acute Urinary Retention: Between 25% and 30% of men who underwent TURP

8-Urinary Incontinence: 6.1%

9-Upper Urinary Tract Deterioration and Azotemia

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95

Elhousseiny El-Zalouey

## Benign Prostatic Hyperplasia

10-Hematuria: gross hematuria and form clots

11-Acute Urinary Retention: Between 25% and 30% of men who underwent TURP had AUR as their main indication in older series

### Treatment Options

#### 1-Medical therapy

##### *Indications:*

- Unfit for surgery
- Refuse surgery
- Early cases

##### *The drugs used are:*

##### 1- Alpha blockers :

- Terazosin
- Doxazosin
- Tamsulosin
- Alfuzosin
- Side effects: dizziness and orthostatic hypertension, which may lead to increased episodes of falls. Due to effects on CNS

##### 2- 5 alpha reductase inhibitors

##### 3- Phytotherapy

- The combination of a 5-alpha reductase inhibitor with an alpha-blocker seems beneficial according to the data currently available.
- Side-effects of 5-alpha reductase inhibitors are minimal

### Minimally invasive therapy

#### 1-Intraprostatic stents

2-Transurethral needle ablation of the prostate (tuna) by increasing the temperature within the prostate and inducing necrosis of prostatic tissue.

#### 3-Transurethral microwave therapy ( TUNA )

#### 2-Transurethral Prostatectomy (TURP)

## Benign Prostatic Hyperplasia

- The gold standard for the surgical management of BPH.
- Prostate from 20---50 gms
- Complications are reduced by training
- Bigger prostate needs longer experience and talent resectionist

### Complications of TURP

1. Bleeding
2. Extravasation,
3. Transurethral Resection Syndrome
4. Intraoperative Priapism
- 5- Mortality: 1.8 %

### 3-Transurethral vaporization of the prostate (TUVP)

- Vaporization and desiccation
- Using thermal energy

### 4-Transurethral incision of the prostate

- Using a Collings knife: an incision is made at the 5- and 7-o'clock positions, or on one side of the midline only.

### 5-Open prostatectomy

- Retropubic
- Suprapubic

- TUIP is the surgical therapy of choice for men with prostates < 30 mL and no middle lobes.

## Prostate Cancer

### Incidence

- Found with advancing age.
- At age of 80 years 80% of men will have malignant foci ( dormant)
- Rare below age of 50
- Cause of death in 2% of men over 50

### Staging System

#### Jewett Staging System

- TA: clinically undetectable tumor confined to the prostate gland and is an incidental finding at prostatic surgery.
- TB: is tumor confined to the prostate gland.
- TC: is a tumor clinically localized to the periprostatic area but extending through the prostatic capsule; seminal vesicles may be involved.
- TD: is metastatic disease.

#### TNM classification

1. TX: Primary tumor cannot be assessed
2. T0: No evidence of primary tumor
3. T1: Clinically unapparent tumor not palpable nor visible by imaging
4. T2: Tumor confined within prostate
5. T3: Tumor extends through the prostatic capsule
6. T4: Tumor is fixed or invades adjacent structures other than seminal vesicles

#### Histopathologic grade (G)

##### Gleason score

The most commonly used system for grading adenocarcinoma of the prostate is the Gleason score .  
even if present in < 5% .

- G1: Well differentiated (slight anaplasia)
- G2: Moderately differentiated (moderate anaplasia)
- G3-4: Poorly differentiated or undifferentiated (marked anaplasia)



## DIAGNOSIS

### 1-Digital rectal examination (DRE)

- Most CaPs are located in the peripheral zone of the prostate and may be detected by DRE when the volume is about 0.2 mL or larger. The risk of a positive DRE turning out to be cancer is heavily dependent on the PSA value

### 2-Prostate-specific antigen (PSA)

Range (4-10 ng/mL)

In routine clinical practice, a free-to-total PSA ratio of < 20% and PSA velocity > 0.75 ng/mL/year have been accepted as valid parameters, which are associated with a higher risk of CaP and which facilitate the indication to perform a prostate biopsy.

#### ▪ Differential diagnosis of prostate nodules

1. TB prostatic nodule
2. Calcular prostatitis
3. Stone impacted in the posterior urethra
4. Chronic prostatitis

### 3-TRUS and b\needle biopsy: Is the surest diagnosis

Transrectal periprostatic injection with a local anaesthetic may be offered to patients as effective analgesia when undergoing prostate biopsies

- Over 95% of primary prostate cancers are adenocarcinomas
- Fine needle aspiration of the prostate (usually performed trans-rectally) has been shown to have an accuracy of diagnosis equal to that of traditional core needle biopsy.

Staging is done by:

1. **Radionuclide bone scans** to detect any bony metastases.
2. **MRI** to examine the entire system
- MRI is a poor tool for evaluating nodal disease.
3. **CT:** can detect grossly enlarged nodes but poorly defines intraprostatic features;
4. **PSA levels** may be able to predict the results of radionuclide bone scan in newly diagnosed patients

## Prostate Cancer

5. *PLND* remains the most accurate method to assess metastases to pelvic nodes, and laparoscopic *PLND* has been shown to accurately assess pelvic nodes as effectively as an open procedure.

### Treatment

#### 1-DEFERRED TREATMENT (WATCHFUL WAITING; ACTIVE MONITORING)

The term deferred treatment or watchful waiting (WW) is used to describe a treatment strategy that includes an active standpoint to postpone treatment until it is required.

##### *Indications*

In presumed localized CaP (Nx-N0, M0):

- Stage T1a – well- and moderately differentiated tumours. In younger patients with a life expectancy of > 10 years, re-evaluation with PSA, TRUS and biopsies of the prostatic remnant is recommended (level of evidence: 2a)
- Stage T1b-T2b – well- and moderately differentiated tumours. In asymptomatic patients with a life expectancy of < 10 years (level of evidence: 2a).

#### 2-RADICAL PROSTATECTOMY

##### *Radical prostatectomy in locally advanced prostate cancer*

##### *Indications*

- In patients with stage T1b-T2, Nx-N0, M0 disease and a life expectancy > 10 years
- Patients with a long life expectancy and stage T1a disease
- Patients with stage T3a disease, a Gleason score of > 8 and a PSA of < 20 ng/mL
- Short-term (3 months) neoadjuvant therapy with gonadotropin releasing-hormone analogues is not recommended in the treatment of stage T1-T2 disease

## Prostate Cancer

- Nerve-sparing surgery may be attempted in pre-operatively potent patients with low risk for extracapsular disease (T1c, Gleason score < 7 and PSA < 10 ng/mL or see Partin tables/nomograms)

### **3-Definitive Radiotherapy:**

1. In localized CaP T1c-T2c N0 M0, 3D-CRT with or without IMRT, is recommended, even for young patients who refuse surgical intervention.

2-Transperineal interstitial brachytherapy with permanent implants

3-Immediate postoperative external irradiation after radical prostatectomy.

4- In locally advanced CaP, OS is improved by concomitant and adjuvant hormonal therapy

### **Radiation complications**

- Acute cystitis, proctitis, and sometimes enteritis
- Potency, in the short term, is preserved with irradiation in the majority of cases

4-Laparoscopic lymphadenectomy: is technically possible and accomplished with much less patient morbidity

5-Cryotherapy: Cryosurgery as a treatment for localized prostate cancer has seen renewed interest because of promising initial reports citing low morbidity, minimal blood loss, short hospital stay, and high rates of negative post-treatment biopsies

### **B-Metastatic disease**

#### **1. Hormone therapy :**

In a clinical sense, most prostate cancers are, at least initially, endocrine-dependent tumors.

A-Bilateral orchiectomy,  
B-Estrogen therapy,  
c- LHRH agonists,  
D-Antiandrogens,  
e-Ketoconazole, and Aminoglutethimide

#### **2- In case of urine retention**

-TUR tunneling: removal of the obstructing tissues

## Testicular Tumors

Currently, testicular tumours show excellent cure rates in the order of 95% for low stages and somewhat less for the more advanced stages of disease

### **Classification:**

The recommended pathological classification (modified World Health Organization) is shown below.

#### **1. Germ cell tumours**

- Seminoma
- Embryonal carcinoma
- Yolk sac tumour
- Choriocarcinoma
- Teratoma (mature, immature, with malignant component)

#### **2. Sex cord stromal tumours**

- Leydig cell tumour
- Sertoli cell tumour (typical, sclerosing, large cell calcifying)
- Granulosa (adult and juvenile)
- Mixed
- Unclassified

#### **3. Mixed germ cell/sex cord stromal tumours**

### **Physical examination**

painless, unilateral intrascrotal mass

### **Scrotal ultrasound**

The sensitivity of scrotal ultrasound to detect a testicular tumour is almost 100%, and ultrasound has an important role in determining whether a mass is intra- or extratesticular. In young men with either a retroperitoneal mass, visceral metastasis or elevated human chorionic gonadotrophin (hCG) and/or alpha-fetoprotein (AFP), an ultrasound of the testes is mandatory.

Magnetic resonance imaging (MRI) of the scrotum offers a sensitivity of 100% and a specificity of 95-100%

## Testicular Tumors

### *Serum tumour markers*

- AFP (produced by yolk sac cells)
- hCG (expression of trophoblasts)
- lactate dehydrogenase (LDH) (marker of tissue destruction).

### *Inguinal exploration and orchidectomy*

Every patient with a suspected testicular mass must undergo inguinal exploration with exteriorization of the testis within its tunics. Immediate orchidectomy with division of the spermatic cord at the internal inguinal ring has to be performed if a tumour is found.

### *Staging and clinical classification*

1- CT Abdominal and pulmonary, extra-pulmonary, and mediastinal nodes are best assessed by means of a computerized tomography (CT) scan.

2-MRI produces similar results to CT

3- **Other examinations**, such as brain or spinal CT, bone scan or liver ultrasound, should be performed if there is a suspicion of metastases in these organs. CT scan or MRI of the skull are advisable in patients with NSGCT and widespread lung metastases.

## TREATMENT: STAGE I GERM CELL TUMOURS

### Stage I seminoma

#### *1-High inguinal orchiectomy*

#### *2-Adjuvant radiotherapy*

Seminoma cells are extremely radiosensitive. Adjuvant radiotherapy to a para-aortic (PA) field with a total target volume of 20 Gy will reduce the relapse rate to only 1-3%.

#### *3-Retroperitoneal lymph node dissection (RPLND)*

not be recommended in stage I seminoma

### NSGCT stage I

Guidelines for the treatment of NSGCT stage I

CS1A (pT1, no vascular invasion); low risk

1. If the patient is willing and able to comply with a surveillance policy and long-term (at least 5 years), close follow-up should be recommended (grade B recommendation).
2. Adjuvant chemotherapy or nerve-sparing RPLND in low-risk patients remain options for those not willing to undergo surveillance. If RPLND reveals PN+ (nodal involvement) disease, chemotherapy with two courses of PEB should be considered (grade A recommendation).

## Testicular Tumors

### *CS1B (pT2-pT4): high risk*

1. Primary chemotherapy with two courses of PEB should be recommended (grade B recommendation).
2. Surveillance or nerve-sparing RPLND in high-risk patients remain options for those not willing to undergo adjuvant chemotherapy. If pathological stage II is revealed at RPLND, further chemotherapy should be considered (grade A recommendation).

6

## TREATMENT: METASTATIC GERM CELL TUMOURS

### Guidelines for the treatment of metastatic germ cell tumours

1. *Low-volume NSGCT stage IIA/B with elevated markers should be treated like "good" or "intermediate prognosis" advanced NSGCT with three and four cycles of PEB, respectively. Stage II without marker elevation (in suspicion of differentiated teratoma) can be treated either by RPLND or close surveillance with delayed surgery.*
2. *In metastatic NSGCT (> stage IIC) with a good prognosis, three courses of PEB is the primary treatment of choice*
3. *In metastatic NSGCT with an intermediate or poor prognosis, the primary treatment of choice is four courses of standard PEB*
4. *Surgical resection of residual masses after chemotherapy in NSGCT is indicated in the case of a residual mass > 1 cm and when serum levels of tumour markers are normal or*
5. *Metastatic seminoma with less than N3M1 disease can be treated initially with radiotherapy. When necessary, chemotherapy can be used as a salvage treatment with the same schedule as for the corresponding prognostic groups of NSGCT*
6. *Advanced seminoma (N3 or M1) should be treated with primary chemotherapy according to the same principles used for NSGCT*



### Germ Cell Tumours

#### Incidence:

Testis tumors account for 1% to 2% of all neoplasms in males (Blandy et al., 1970). In the age range from 20 to 35 years, testis tumors are the most common malignancy, excluding leukemia (Patton et al., 1959).

#### Age:

The average age of appearance in various series ranges from 30.7 to 41.9 years. Embryonal cell carcinoma is seen slightly earlier, with an age range from 26.1 to 33.0 years.

#### Causes

▪ Unknown, it may be due to:

##### 1- Undescended testis:

- 7-10% of testicular tumors develop in cryptorchid testis.
- 5-10% occurs in contralateral testis.
- 1/20 of abdominal testis.
- 1/80 of inguinal testis.

2- Exogenous estrogens to the mother during pregnancy → relative risk of developing testicular tumors from 2.8 to 5.3 over the expected incidence.

3- Trauma and infection-related testicular atrophy.

#### Pathology:

##### Seminoma (35%)

Classic 85%	Anaplastic 5-10%	spermatocytic 5-10%
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##### Non Seminoma (65%)

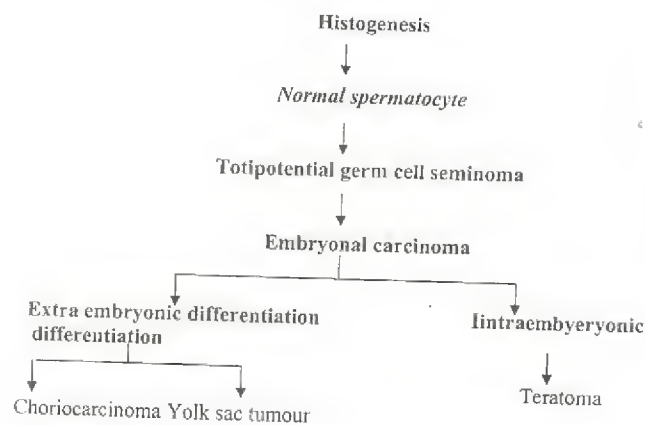
Embryonal 20%	Teratoma 5%	Choriocarcinoma < 1 %	Mixed tumors 40%
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## Testicular Tumors

Infantile adult

Teratocarcinoma  
seminoma 6%



### Spread

- With exception of Choriocarcinoma (Haematogenous spread).
- Testicular tumors spread to the Para aortic lymph nodes in a stepwise fashion.
- Local spread is uncommon.

### Staging:

#### I- Pathological Staging

- Ptx: cannot be assessed
- Pt0: no tumors
- Ptis: cancer in situ
- Pt1: limited to testis and epididymis
- Pt2: in addition extend to tunica and spread in blood and lymphatic
- Pt3: Invade spermatic cord as well
- Pt4: invade scrotum

#### II- Clinical staging

**Clinical staging of testicular**

**tumours.**

Stage 1 The tumour is confined to the testis.

Stage 2 There is involvement of the abdominal lymph nodes which are either manually palpable or demonstrated by radiological or other investigations.

Stage 3 Involved nodes above and below the diaphragm.

Stage 4 Extranodal metastases.

**Diagnosis**

In any patient with a solid, firm, intratesticular mass, testicular cancer must be the considered diagnosis until proved otherwise.

Ultrasonography of the scrotum is basically an extension of the physical examination

**Symptoms**

1. Painless swelling.
2. Acute testicular pain in 10%
3. Symptoms of metastatic Disease 10%
4. Gynecomastia, seen in about 5%
5. Asymptomatic 10%

**Signs**

1. Any firm, hard, or fixed area within the substance of the tunica albuginea
2. Bulky abdominal Mass
3. Gynecomastia in:
  - 5% of all Germ Cell tumours.
  - 30-50% of Sertoli & Leydig cell tumors.

**Investigations**

- 1- Urinalysis and blood picture
- 2- Serum creatinine and liver functions
- 3- Fasting and post prandial blood sugar

## Testicular Tumors

### 4- Tumor markers

**Tumour Markers**

	HCG%	AFP%
Seminoma	7%	0
Teratoma	25	38
Teratocarcinoma	57	64
Embryonal	60	70
Choriocarcinoma	100%	0

### Radiology

- **Scrotal U/S** : is a rapid, reliable technique to exclude hydrocele or epididymitis
- **Chest X-ray**. Posteroanterior and lateral studies should be the initial radiographic procedures performed.
- **Abdominal CT**.
  - The most effective means to identify retroperitoneal lymph node involvement. CT scanning has replaced intravenous urography and pedal lymphangiography as the procedure of choice for evaluation of the retro peritoneum.
  - Pedal lymphangiography has an error rate of roughly 25% false-negative and 10% false-positive results.
- **MRI**:
  - MRI offers no advantage over CT for imaging and staging of the retro peritoneum in patients with testis cancer.

### Differential Diagnosis

- **Diagnosis** : Is incorrect in 25%
- **D. D includes**: Epididymo-orchitis  
Hydrocele  
Spermatocele.

### Treatment

- **High Inguinal Orchiectomy** is the First step

## Testicular Tumors

### ▪ In Seminoma :

- a. Low stage: Radiation 2500-3000 rads.  
Chemotherapy salvages procedure.
- b. High stage: Chemotherapy (BEP 4 cycles).

### ▪ Non-Seminoma

- Low stage:
  - Surveillance
  - Retroperitoneal lymph node dissection
- High stage:
  - Chemotherapy
  - Excision of residual mass.

### Prognosis

<i>Seminoma</i>		<i>No Seminoma</i>	
Stage I	98%	A -----	96-100%
Stage IIa	92-94%	B- low volume-----	90%
High stage→	35-75%	C-Large volume →followed surgery	55-80%

## Renal Transplantation

### Introduction

#### Patient Selection and Preparation

To be eligible for a graft, the patient must have evidence of endstage renal failure

#### A-Living Donors:

##### Selection and evaluation of donors

The selected donor should have:

- Normal kidney function and comparable function on both sides.
- Normal anatomy of the kidney. Slight variations, such as double arteries are acceptable.
- Good health status with absence of systemic or local diseases. He should be psychologically normal.
- Proper age: usually 21 years or greater.
- He should be willing to donate, highly motivated and altruistic.

##### Principles of donor nephrectomy

#### B. Cadaveric Donors:

## Renal Transplantation

- Proper diagnosis of Brain death is essential.
- Organ retrieval needs special team.

### Methods of kidney preservation

There are two methods of kidney preservation:

- Continuous hypothermic perfusion (which is not currently necessary unless the donor is a NHBD).
- Initial flushing followed by ice storage.

### Period of organ preservation

The period of cold ischaemia should be kept as short as possible.

## Immunosuppressant

**AIM:** To prevent rejection.

**Types:** Usually a combination of:

1. Calcineurin inhibitors:

Cyclosporine A.

Tacrolimus (FK 506).

2. Azathioprine or mycophenolate mofetil (cellcept).

3. Corticosteroids.

**Time:** life long.

### Types of Rejection

Acute cellular rejection.

Acute antibody-mediated rejection.

Or hyper acute rejection.

Chronic rejection.

### Complications

1. Surgical Complications

## Renal Transplantation

a- Acute postoperative hemorrhage can result from disruption of a vascular suture line.

b- Renal artery stenosis: Renal Arteriography is indicated whenever an allograft recipient has severe hypertension or unexplained deterioration in renal function

c- Graft rupture: Spontaneous allograft rupture is an uncommon complication that usually occurs within the first month following transplantation (Novick, 1982). Graft rupture is most often seen in transplant recipients undergoing an acute rejection episode.

D-Urologic comp. e.g. urinary leaks, ureteric obstruction, ureteric fistula, lymphocytes, stone formation.

E-Vascular comp. e.g. RA thrombosis, RA stenosis, RV thrombosis, bleeding etc...

F-General. E.g. DVT, cardiopulmonary and wound complications.

### 2. Medical Complications

#### A- Early:

- Infections.
- Acute rejection.
- Complications of immunosuppression.

#### B- Late:

- \* Chronic rejection.



## Renal Transplantation

Malignancy: Renal transplant patients experience an increased susceptibility to malignancy

Hyperlipidemia occurs in 50% to 80% of renal-transplant recipients

Post transplant Hypercalcemia hyperparathyroidism occurs in approximately 30% of patients

### Graft Survival

	1 year	5 year
LIVING DONOR:	90 – 95%	>75%
CADAVERIC DONOR:	85 – 90%	>70%

### DEVELOPMENT OF A NEW TUMOUR IN THE RECIPIENT AFTER TRANSPLANTATION

- Skin cancer, 40%.
- Lymphoproliferative disease, 11%.
- Lung cancer, 5%.
- Renal tumours, 5%.
- Kaposi's sarcoma, 4%.
- Cervical cancer, 4%.

## Erectile Dysfunction

### Definition:

Inability to get sufficient erection to do sexual act.

### Mechanism of Erection

- Erection thus involves sinusoidal relaxation, arterial dilatation, and venous compression

### Psychogenic erection

- Psychogenic erection is the result of audiovisual stimuli or fantasy. Impulses from the brain modulate the spinal erection centers (T11-L2 and S2-S4) to activate the erectile process.

### Reflexogenic erection

- Reflexogenic erection is produced by tactile stimuli to the genital organs.

### Nocturnal erection

- Nocturnal erection occurs mostly during rapid-eye-movement (REM) sleep.

### Major Risk Factors for ED

- Aging
- Chronic disease
  - Heart disease
  - Hypertension
  - Diabetes
- Smoking
- Progressive decline in physiologic function.
- Increased prevalence of chronic diseases!!
- Psychological issues.
- Partner issues.

### Hypertension

- Out of 104 hypertensive patients (34-75 y)
  - 68.3% reported ED

## Erectile Dysfunction

- 45.2% reported severe ED
- ED tends to be more severe in those with hypertension than the general population

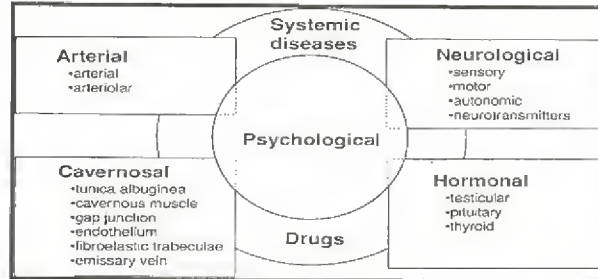
### Antihypertensive Medications

- Diuretics and  $\beta$ -blockers associated with highest incidence of ED and  $\alpha$ -blockers with lowest incidence (1)
- Other studies indicate that thiazide diuretics pose greater risk than  $\beta$ -blockers (2,3)
- ACE inhibitors found not to increase ED risk

### Smoking

- Smokers have a 2-fold increased risk of moderate to complete ED.
- Lower prevalence of ED in former smokers compared with current smokers
- Association between smoking and ED is likely due to impairment of endothelium-dependent smooth muscle relaxation

### Causes-----Classification



### Psychogenic

- Previously, psychogenic impotence was believed to be the most common type, with 90% of impotent men thought to suffer from this condition.

### Neurogenic

Because erection is a neurovascular event, any disease or dysfunction affecting the brain, spinal cord, cavernous and pudendal nerves, or receptors in the terminal arterioles and cavernous smooth muscles can induce dysfunction.

## Erectile Dysfunction

### Endocrinologic

- Hypogonadism: (1) testosterone enhances sexual interest; (2) testosterone increases frequency of sexual acts; and (3) testosterone increases the frequency of nocturnal erections but has little or no effect on fantasy-induced or visually induced erections in :
- Hyperprolactinemia
- Diabetes mellitus

### Arteriogenic

- Atherosclerotic or traumatic arterial occlusive disease of the hypogastric-cavernous-helicine arterial tree can decrease the perfusion pressure and arterial flow to the sinusoidal spaces, thus increasing the time to maximal erection and decreasing the rigidity of the erect penis.

### Cavernosal (Venogenic)

#### May result from:

- 1-large venous channels draining the corpora cavernosa.
- 2-Degenerative changes (Peyronie's disease, old age, and diabetes) or traumatic injury to the tunica albuginea (penile fracture).
- 3-Insufficient trabecular smooth muscle relaxation.
- 4-Acquired venous shunts

### Drug-Induced

- Anti hypertensives
- Antipsychotics and antidepressants

### Diabetes and ED

- Occur in 35% to 75% of men with diabetes mellitus, with onset occurring at an earlier age than in those without diabetes.
- Diabetes may cause ED through its effects on CNS and peripheral nerve function, androgen production, psychological factors, vascular integrity, and endothelial and smooth muscle function.

## *Priapism*

### Definition:

A pathologic condition of a penile erection that persists beyond or is unrelated to sexual stimulation. It is usually a painful, rigid erection characterized clinically by absent cavernous blood flow.

### Causes of priapism

- 1-Sickle-Cell Anemia
- 2-Intracavernous Injection
- 3-Neurologic Disorders.
- 4-Malignancy
- 5-Drug Therapy.eg. Such as hydralazine, guanethidine,
- 6-Trauma.eg. Blunt perineal trauma or trauma to the cavernous tissue.

### Evaluation of ED

- Questionnaire
  - Nocturnal Penile Tumescence Testing
  - RigiScan: to measure penile rigidity
  - Audiovisual Sexual Stimulation
  - Routine endocrinologic testing
  - Neurological examination
  - Vascular Evaluation: Penile Brachial Pressure Index. The penile brachial index (PBI) represents the penile systolic blood pressure divided by the brachial systolic blood pressure
  - Combined Intracavernous Injection and Stimulation Test
- ICI of papaverine: both inexpensive and minimally invasive / the most commonly performed diagnostic procedure for ED
- We currently use alprostadil (PGE1), a potent vasodilating agent that is metabolized / injecting 10 to 20 µg through an ultrafine-gauge half-inch needle (27 to 29 gauge) into the corpus cavernosum

### Second-Line Evaluation of Penile Blood Flow

- Duplex Ultrasonography
- Color duplex Doppler ultrasound (CDDU) is a further advance in sonography; it aids in visualizing vessels, with the Doppler computer assigning color to flowing blood.

## Erectile Dysfunction

### Venous leakage

Diagnosed by:

- Cavernosography involves the infusion of radiocontrast solution into the corpora cavernosa during an artificial erection to visualize the site of venous leakage.

### Treatment Of Erectile Dysfunction

#### Non surgical Treatment of Erectile Dysfunction

- Lifestyle Changes :( regular exercise, a healthy diet, smoking cessation, alcohol in moderation only).
- Changing Medications.
- Psychosexual Therapy.
- Hormonal Therapy: eg. Testosterone.
- In patients failing sildenafil therapy, correction of androgen deficits may have an additional synergistic benefit.

#### (1) Centrally Acting Drugs:

- 1-Yohimbine,
- 2-Serotonergic Drugs: Trazodone
- 3-Dopaminergic Agonist:  
Apomorphine; that stimulates proerectile signaling

#### (2) Phosphodiesterase Inhibitors:

- Sildenafil citrate (Viagra):Improvement in erections were reported in 56%, 77%, and 84% of subjects taking 25, 50, and 100 mg, respectively
- Sildenafil is absolutely contraindicated for men using nitrates

#### (3) Intraurethral Therapy: Medicated Urethral System for Erection

- Alprostadil: by means of intracavernous and intraurethral routes.

#### (4) Intracavernous Injection

- Papaverine: The advantages are its low cost and stability at room temperature. The major disadvantages are the higher incidence of priapism
- Alprostadil (PGE1): causes smooth muscle relaxation, vasodilatation, and inhibition of platelet aggregation through elevation of intracellular cAMP /In a study comparing the efficacy of Caverject and Prostin VR in 120 patients, no significant difference was noted
- In summary, alprostadil is an effective agent and should be considered the drug of first choice for the diagnosis and management of ED in the oral agent failure/contraindication group of patients.
- Drug Combinations: a combination of papaverine (30 mg) and phentolamine (0.5 mg) for self-injection.

## Erectile Dysfunction

### (5) Vacuum Constriction Device

- Combining ICI with the vacuum constriction device may enhance the erection
- The device can also be used successfully by men with a malfunctioning penile prosthesis in place and has been used after explantation.

### B. Surgical treatment

- Penile prosthesis:  
Two broad categories: the malleable or semirigid and the inflatable devices
- Vascular surgery: For artery and for venous leaks.



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